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# AN ACCOUNT
# OF THE DIFFERENT KINDS OF
# *SHEEP*
# FOUND IN *THE RUSSIAN* DOMINIONS, &c.

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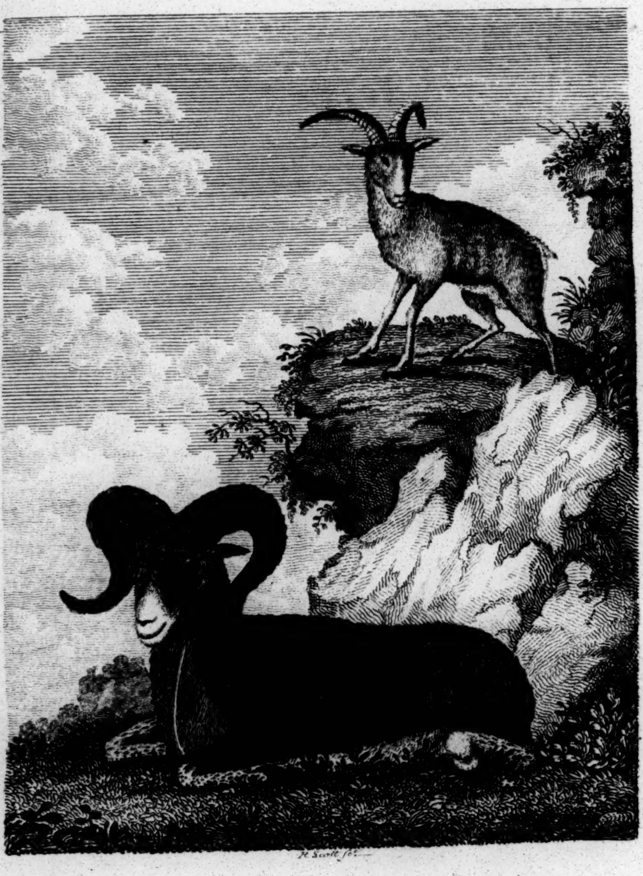

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Russian Sheep, PLATE FIRST.

THE ARGALI.

18 Bh

# AN ACCOUNT
# OF THE DIFFERENT KINDS OF
# *SHEEP*
# FOUND IN *THE RUSSIAN* DOMINIONS,
# AND AMONG
# THE TARTAR HORDES OF ASIA:

BY

**D^R PALLAS.**

K.

ILLUSTRATED WITH SIX PLATES.

TO WHICH IS ADDED,

FIVE APPENDIXES TENDING TO ILLUSTRATE
THE NATURAL AND ECONOMICAL HISTORY OF SHEEP
AND OTHER DOMESTIC ANIMALS.

BY

*JAMES ANDERSON LLD.*
FRS. FAS: S.
*Member of different academies, and author of several performances*

EDINBURGH
PRINTED, AND SOLD BY T. CHAPMAN FLEET STREET LONDON
1794.

25

Jos: Banks

B L

TO THE

SOCIETY INSTITUTED AT EDINBURGH,

FOR THE IMPROVEMENT OF

**BRITISH WOOL,**

THE FOLLOWING ESSAYS,

TENDING TO ILLUSTRATE THE ECONOMICAL HISTORY

OF THE

SHEEP,

*And the circumstances on which the melioration of wool materially depend.*

ARE

RESPECTFULLY INSCRIBED

BY

THE EDITOR.

# ADVERTISEMENT.

The following account of Ruſsian ſheep, contains a full description of several varieties of that useful domestic animal that are scarcely known, and never have been naturalised in any part of Europe. It was originally written by Dr Pallas, and has been selected from the Latin notes of that celebrated naturalist, by an engenious and obliging correspondent in Ruſsia, [*Arcticus*,] under the inspection of Dr Pallas, for the purpose of being inserted in the Bee, a literary journal publiſhed at Edinburgh, in which it was first publiſhed. The first, second, and fourth appendixes were publiſhed succeſsively in the same journal; from which they are now selected. To these have been added,

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As a number of miſcellaneous remarks on the animal and vegetable kingdom, occur in the courſe of theſe inveſtigations, which are calculated to excite the attention of future inquirers, and lead to illuſtrative experiments, it has been judged expedient to add to this volume, an index of reference, by means of which the at- attentive ſpeculator may be, without trouble, directed to the particular objects he may wiſh at the time to inveſtigate.

The notes now added on Dr pallas's eſsays are marked to diſtinguiſh them from thoſe of the author. The Letters J. A. denote Dr Anderſon, *Arct. Arcticus.*

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# INTRODUCTION.

Thanks to our great countrymen Bacon, Boyle, and Newton, with their worthy succeſsors, theoretic jargon, unsupported by facts, is baniſhed from natural philosophy, and in a great measure from science at large, insomuch that our modern sophists are obliged to direct their hypothetic artillery, to the theory of government, and will probably retard its progreſs, as long as they did that of *physics*, which has of late years made such wonderful advancement, by following the wise plan suggested by the above mentioned *real* philosopher's, who were, and will ever remain, even in the tomb, the glory of their country.

Surely sir, I need not caution the society for the melioration of Britiſh wool, to whom this paper is principally addreſsed, against permitting theoretic reasoning, on the nature of *ſheep*, to influence any of their operations for the advancement of knowledge on that important subject.

They will certainly regard as mere unsupported conjectures, the common place ideas, that the useful animal which makes so deservedly the object of their research, must be small to carry fine wool, large to carry coarse; that it must be fed exactly in this or in that manner; and that it must inhabit precisely a given climate, or which is the same thing, live exactly at such a diſtance above the level of the sea, to enjoy the advantage of a fine fleece.

We are certainly not as yet arrived at that point of information, to speak positively on the subject, although much has been done by intelligent gentlemen of late years; but must submit to a long and patient course of judicious experiment, to be able to decide on facts aſserted with so much boldneſs.

In the mean time, every one who wiſhes well to such a laudable undertaking, ſhould contribute their mite by giving the best information their situation and knowledge will permit, relative to the ſheep in the country they inhabit, including their description, measurement, weight, fleece, food, and general mode of life, details which, though fatiguing to some readers, will be highly useful and acceptable to those who are in search of information on the natural history of the animal; and more particularly to the society whose patriotic endeavours are directed to a subject of so much national importance.

I make no doubt, but your plodding men of habit, will sneer at such a research, as they do at every thing they do not comprehend, or which militates against the practice of their fathers; but I will venture to affirm, that it is a much easier taſk to change the fleece of ſheep, than the morals, manners, and even nature of the human species, to fit them for the enjoyment of metaphysical primitive liberty, before the commencement of social compact, which *modern philosophers* are persuading us of the practicability of. But as philosophers are not in general the most opulent members of civil society, there is some danger that they wiſh to fiſh in troubled water, when the sovereigns they are setting up, have thrown all into anarchy and confusion.

To return to the more uesful animal which is the subject of this paper, permit me to say that as example is better than precept, I have endeavoured to set one to our countrymen living abroad, by collecting every thing that my situation will permit, confined as I am by duty to the capital of an empire, relative to the ſheep of this country; and I make no doubt but you will give me credit for having had recourse to the ample information collected by my learned friend Dr Pallas, in his wide extended travels in this empire, and amongst the pastoral nations of Great Tartary, *&c.* from the frontiers of China, to those of Europe. These people are all ſhepherds, as well as the Nomades of Siberia, and several countries of Europe, under the dominion or protection of the

Ruſsian empire; and the great riches of them all conſist principally in ſheep.

There are few of these pastoral nations but the doctor saw, either in full horde, or detached parties, so that the opportunities he had of examining not only the wild, but *domestic* ſheep, in several of its varieties, and almost in a state of nature, from their little controled, nay, almost unlimited range, in the wide plains of Tartary, were more numerous than ever fell to the lot of any man who has treated the subject.

But the remarks and observations of our learned academician will be more particularly valuable to the society; as his equal knowledge in zoology, and the other branches of natural history, enabled him to give an account of the ſheep in a very superior manner; noting the climate, soil, water, and plants, of every district where he found a different variety of the animal. The doctor remarked with the eye of a real naturalist, the influence of these, joined to exercise, on the stature, vigour, plumpneſs, and fleece of ſheep; and has described the distinguiſhing marks of the four varieties he met with, as well as the *musimon* or wild ſheep, in a masterly manner. In ſhort his remarks furniſh an excellent model for those of others, who may pursue the subject; and I must add in terms of much gratitude, that he furniſhed in the most liberal manner, all the notes he had made in his travels, on the subject of ſheep, the moment your correspondent signified an intention to write this paper; and has since *reviewed* the whole, to see if his meaning had been siezed in every part, and the result of his observations faithfully given.

The only part your correspondent can then claim, is that of having given the sense of the original author in Engliſh, to the best of his power; and to have taken the liberty of explaining what he took to be his meaning, whenever such illustration was neceſsary, and the text too laconic for the purpose of the society; as Dr Pallas wrote for the learned alone in the dead language he employed, and the author of this paper for the public in general. However my learned friend having given his sanction to the whole, by reading it over at the particular desire of your correspondent, and making occasionally a remark, has of course adopted the paper, and thereby rendered it much more worthy of the attention of the society.

## ACCOUNT OF SHEEP, &c.

### *Ovis Fera, Siberian Argali, or Wild Sheep.*

I SHALL begin my paper with a general description of this animal, as it appears to be the parent of all our domestic varieties of ſheep, however changed by servitude, climate, food, &c. in the hands of man; but it would swell this diſsertation to a volume, to enter into its diſsection, and all the other minutiæ of zoology with my learned friend. The same observation is applicable to the many physiological and anatomical inquiries with which his notes are enriched, but which I have taken the liberty only to give an outline of, with the conclusions he draws from them; and even that I presume is fully as much as will fall into the plan of the society, or suit the bounds allotted to papers in the Bee; but the curious inquirer may have recourse for that species of information to Dr Pallas's learned work, his Spicilegia Zoologica, fasciculus undecimus, printed at Berlin in 1776.

Dr Pallas found the *ovis fera*, or wild ſheep, in all its native vigour, boldneſs, and activity, inhabiting the vast chain of mountains which run through the centre of Asia to the eastern sea, and the branches which it sends off to Great Tartary, China, and the Indies.

This wild animal which our learned naturalist declares to be the *musimon* of Pliny, and the *ophion* of the Greeks, is called *argali* by the Siberians, which means wild ſheep; and by the Ruſsians *kamennoi barann*, or ſheep of the rocks, from its ordinary place of abode.

It delights in the bare rocks of the Asiatic chain just mentioned, where it is constantly found baſking in the sun; but it avoids the woods of the mountains, and every other object that would intercept the direct rays of the glorious luminary.

Its food is the Alpine plants and ſhrubs it finds amongst the rocks. The *argali* prefers a temperate climate, although he does not disdain that of Asiatic Siberia, as he there finds his favourite bare rocks, sun ſhine, and Alpine plants; nay it is even found in the cold eastern extremity of Siberia and Kamtſhatka, which plainly proves that nature has given a most extensive range to the ſheep in a *wild* state, equal even to what ſhe has given to *man*, the lord of the creation ; a fact that ought to make us slow in believing the aſsertions hinted at in my introduction, which tend to prove the ſheep a local animal ; or at least confined to certain latitudes, to poſseſs it in all its value *.

The *argali* loves solitude, or poſsibly perfect liberty, and therefore flees the haunts of all-subduing man ; hence it gradually abandons a country in proportion as it becomes peopled, if no unsurmountable obstacle obstructs its flight ; insomuch that Dr Pallas thinks that nothing but the surrounding sea can account for the wild ſheep being found in an inhabited island ; as is sometimes the case.

The ewe of the *argali* brings forth before the melting of the snow. Her lamb resembles much a young kid ; except that they have a large flat protuberance in place of horns, and that they are covered with a woolly hair frizzled and of a dark grey. There is no animal so ſhy as the

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* We learn from Bruce's travels, or rather we have there a confirmation ot what was known long ago, that the *horse* is a native of a very hot climate, and is found in his greatest beauty, activity, fire, *&c.* between the latitude 20° and 36° ; yet there is no part of the world where that noble animal is reared in greater perfection than in Great Britain, where by croſsing the breed, you have obtained all the qualities of the different races united into one.

*argali*, which it is almost impoſsible to overtake on such ground as it keeps to. When pursued it does not run streight forward, but doubles and turns like a hare, at the same time that it scrambles up, and over the rocks with wonderful agility. In the same proportion that the adult *argali* is wild and untameable, the lamb is easy to tame when taken young, and fed first on milk, and afterwards on fodder, like the domestic ſheep, as has been found on numerous experiments made in the Ruſsian settlements in these parts.

This Animal formerly frequented the regions about the upper *Irtiſh*, and some other parts of Siberia, where it is no longer seen since colonies have been settled in these countries. It is common in the Mongalian, Songarian, and Tartarian mountains, where it enjoys its favourite solitude or liberty. The *argali* is found likewise on the banks of the Lena, up as high as 60 degrees of north latitude; and it propagates its species even in Kamtchatka, as noticed before. The doctor gives us a description of a young *argali* ram of that country, which he took from Steller's zoological manuscript, a naturalist who had been sent in a former reign to explore the wilds of Siberia.

The *argali* is also found in the mountains of *Persia*, of which variety we have a stuffed ſkin in the museum of the imperial academy of sciences, sent here by Gmelin, who travelled about the same time with Pallas; and one of that last mentioned gentleman from *Dauria*, of which he has given a general description whilst alive, to be seen at the end of this article; although he had not then sufficient leisure to be so particular as he has been in the description of a female *argali*, (likewise translated in this article,) although not with all the minuteneſs of the doctor's zoological accuracy; for the reasons given above.

The same wild animal is also said to obtain in the Kuril islands in great size and beauty.

The *argali* purges itself in the spring, (like all the domestic varieties of the ſheep, when left at liberty to follow their instinct; as will be more fully ſhown in the sequel,) with acrid plants of the anemonoide kind, till milder plants spring up, and ſhrubs begin to sprout, which with Alpine plants constitute its usual food. It likewise frequents the salt marſhes which abound every where in Siberia; and even licks the salt efflореſsence that rises on the ground, a regimen that fattens them up very quickly, and fully restores the health, vigour, and fleſh they had lost during winter, and during the purging course, so wonderfully dictated to the ſheep species, together with the restorative, by the Almighty, whether in a wild or tame state, if left to roam at large where the neceſsary plants are to be found.

I cannot finiſh the subject of the Siberian *argali* or *musimon* of Pallas, without taking notice of a note, by your learned naturalist Mr Pennant, to the article ſheep in his Britiſh Zoology, where he says, that he has had thrice an opportunity within these two years, of examining the *musimon*, and he found that both in the form of the *horns*, and ſhortneſs of the tail, it has the greatest agreement with the *goat*, in which species he has therefore placed it in his Synopsis, with the trivial name of *Siberian*. Now Mr Pennant does not mention from what country these animals were which he examined, but certainly they must have been different from the Siberian *argali*, of which I have sent an exact coloured drawing, furniſhed by the doctor himself, and which agrees with the ſheep in every thing else; and as for the tail, its length is so various in the different varieties of ſheep, from a couple of inches to two feet and upwards, (as will be seen in this paper) that no *specific* difference can be concluded from that. But Dr. Pallas also found the parent animal of the goat species in a *wild state*, on the mountains of Caucasus and Taurus, which he has named *ægagrus*, and which agrees in all eſsential characters with the domestic goat, particularly in the *horns*: but this wild goat must not be confounded with the *Ibex*, another animal resembling the goat at first sight, but widely differing from it on nearer inspection, more particularly in the horns, of which I send you a drawing, as well as of those of the *ægagrus*, (*see plate* 4th) to be compared by the curious with one another, and with those of the *Siberian argali*, well delineated in the coloured figure of the animal. The *ibex*, of which Dr. Pallas has learnedly treated, is found on the same mountains of Siberia with the *argali*, but inhabiting a much higher region, amidst clouds and snow, whilst the *wild ſheep* keeps to the lower, and delights in the warmth of the sun, reflected from the bare inferior rocks, as much as the *ibex* does in cold. It by no means falls into the plan of this paper, to enter further into the history of these two curious animals, which are both in a manner foreign to my subject, and the pursuits of the society to which it is addreſsed. I ſhall only take the liberty to suggest a doubt, (which I hope will not offend so respectable a zoologist as Mr. Pennant.) Whether the three animals he examined were not rather the *ægagrus* than the *argali* of Pallas? from the circumstance of his having ranked them with the *goat* species. If they came from the East Indies, they were probably of the *ægagrus* kind, as that animal frequents the mountains of India and Persia. Since writing the above, Pallas tells me, that Mr Pennant has publiſhed a later work on the zoology than the one I have, and that he has poſsibly cleared up the subject there, although he does not remember to have read the article, nor did he the note I have commented on, in the midst of his numerous and various labours in natural history, and other literary vocations, recommended to him by her imperial majesty. *

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### *Description of the* OVIS FERA, *or wild ſheep, the* ARGALI *of the Siberians.*

It is about the *height* of a small hart, but its make is much more robust and nervous.

Its *form* is leſs elegant than that of the deer, and its legs and neck ſhorter.

The male is larger than the female, and every way stouter.

Its *head* resembles that of a ram, with long straggling hairs about the mouth ; but no beard.

Its *ears* are rather smaller than those of a ram.

The form of its *horns* will be best understood by the inspection of the drawing sent ; they weigh in an adult sometimes sixteen pounds.

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* Mr. Pennant in the last edition of his natural history of quadrupeds, makes three several species. 1. wild ſheep, (*argali, ophion, musimon.*) 2. Bearded, which he formerly called Siberian goat. This differs from the *argali* by its beard, and the great length of hair on its breast. 3. Caucasan goat, the ægagrus of Pallas. Thus he restores the ægagrus to the goat, and the other to the ſheep genus.

*Tail* is very short.

The summer coat consists of ſhort hair, sleek, and resembling that of a deer.

The winter coat consists of wool like down, mixed with hair, every where an inch and an half long at leaſt, concealing at its roots a fine woolly down, of a white colour, in general.

As to colour and all other particulars, I refer to the drawing, executed and coloured from life by the doctor's draughtsman, under his own eye.

The doctor examined in Dauria, a lamb of the *argali* or wild ſheep, and found its coat even four or five inches long in some parts, and sufficiently soft, with hair much finer than in the deer kind; nor was it undulated like it.

The colour of its coat was in general of a dark greyiſh brown, with white tips to the longer hairs, and consisted of hair mixed with wool, of a dark iron grey.

The doctor likewise saw in 1768, amongst some garments brought from the islands lying between the continent of America and Kamtchatka, strings that were made of a *white wool*, which the doctor was certain had been taken from the *argali*, and he was confirmed in his opinion on observing that it was mixed with hair.

Dr. Pallas on reading this article, made the following addition to it.

By accounts lately received from the Tſhutſki, the *argali* is found of a white colour on the *continent of America*, opposite to their country. It is likewise of a whitiſh colour at Kamtchatka; which was another reason for supposing that the above mentioned strings were made from the fleece of that animal.

The doctor procured in the Ruſsian Dauria, between the rivers Onon and Argun, an adult male *argali*, or wild ram, with an adult female, or wild ſheep. Below is given the weight and measurement of them, as likewise of an argali lamb of about three months old.

The male *argali* or wild ram, weighed, whilst entire, three hundred and ten medical pounds. It measured in French feet, inches, and lines.

| | *f.* | *i.* | *l.* |
|---|---|---|---|
| Total length from the upper lip to the anus | 5 | 9 | 10 |
| Length of the horns following their curve, | 3 | 10 | 9 |
| Distance between them at the base, - - | | | 6 |
| Their circumference at the base, - - | 1 | 2 | 11 |
| Distance between their tips in front, - | 2 | 7 | 9 |
| Ditto between their posterior arches, measured over the neck. | 1 | 4 | 2 |

The weight of a single argali horn with its *oſseo nucleo* was sixteen Ruſsian pounds.

(*N. B.* Ruſsian make 36 Engliſh pounds.)

B L

The above described male argali, Dr. Pallas had only time to examine superficially, and is the same of which the ſkin is to be seen, stuffed, in the museum of the imperial academy of sciences at St. Peterſburg, with another of the Persian variety of the argali, sent by Gmelin, about the same time. But the doctor's description of the following is much more distinct.

The female *argali* or wild ſheep weighed when entire, 209½ medical pounds.

| | *f.* | *i.* | *l.* |
|---|---|---|---|
| Total length from the upper lip to the anus | 5 | 3 | 0 |
| *Forequarter*, its height from the heel to the spine. | 3 | 4 | 0 |
| *Hindquarter*, its height from ditto to ditto. | 3 | 5 | 7 |
| *Head*, length of it from the upper lip to the middle of the forehead, directly between the horns. | 1 | 0 | 4 |
| Circumference of the muzzle measured over the *sinus labiorum*. | | 9 | 11 |
| Distance between the eyes and ears, | | 2 | 0 |
| Ditto between the eyes. | | 6 | 0 |
| Ditto between the ears and horns. | | 1 | 4 |
| Ditto between the ears, measured over the throat. | 1 | 0 | 8 |
| Length of the ears, | | 4 | 8 |
| Circumference at their base, | | 4 | 3 |
| Distance between the horns at their base, | | 1 | 2 |

| | f. | i. | l. |
|---|---|---|---|
| Distance between them at their tips. - | 1 | 2 | 8 |
| Length of the horns following their curve, | 1 | 4 | 0 |
| Circumferance at their base, - - | | 6 | 8 |
| Ditto, of the neck at the head, - | 1 | 2 | 0 |
| Ditto, of ditto at the ſhoulders, - | 1 | 5 | 11 |
| Length of the neck, - - - | 1 | 0 | 7 |
| Trunk, circumference of it at the fore legs, | 3 | 6 | 5 |
| Ditto ditto in the middle, - - | 3 | 10 | 6 |
| Ditto ditto at the hind legs, - - | 3 | 2 | 5 |

An argali lamb about three months old, weighed whilst entire, eighty-four medical pounds.

| | f. | i. | l. |
|---|---|---|---|
| Total length from the upper lip to the anus, | 2 | 11 | 8 |
| *Forequarter*, height from the heel to the spine, | 2 | 1 | 9 |
| *Hindquarter*, height of ditto from ditto, | 2 | 3 | 9 |
| Length of the *horns* in following their curve, | 2 | 3 | 9 |
| Distance between them at their base, - | | | 10½ |
| Ditto between their tips measured over the muzzle, | 1 | 9 | 9 |
| Ditto, between their posterior arches, measured over the neck, | 1 | 2 | 6 |
| Circumference of them at their base. - | 1 | 0 | 0 |

## *Domestic Sheep.*

HAVING given an account of the argali or wild ſheep, I ſhall now enter upon Dr Pallas's remarks, made during his wide extended travels in the Ruſsian empire, more particularly in Siberia, and amongst the pastoral nations of Great Tartary, relative to the domestic ſheep.

The doctor found what he regards as only one species of ſheep in the whole range of his journey, subdivided into *four* varieties, and distinguiſhed by their tails, the form of their heads, their ears, and fleece. These four varieties are the long tailed, the ſhort tailed, the fat tailed, and a mixed breed of ſheep with longiſh tails, fat at the base, with a species of lean bony apendage tapering to a point. So that this able zoologist condemns as unfounded and fanciful, the erroneous idea of making *specific* differences of the accidental varieties which education or mode of life, climate, food, and croſsing the breed, have produced in *ſheep*, as in pigeons, dogs, and other domestic animals; and in conformity to this o pinion he considers the *ovis laticaudata*, *longicauda*, *piloſa*, *Africana*, *Guineenſis*, *strepſiceros*, *Hungarianos*, *&c.* of authors, as only accidental *varieties* of the same species of ſheep; as he does the *capra Syriaca ſeu mambrina*, and all the other fanciful subdivisions of authors of the goat species, as only *varieties* of that animal.

However, it must be acknowledged, that Dr Pallas had opportunities in his extensive travels, of clearing up the doubts which prevented other naturalists before him, from deciding on that curious subject. It is well known, that if all the different kinds of ſheep, or of any other animal, when the breeds are croſsed in every poſsible direction, always generate a *prolific* stock, or in other words, produce young which are capable of propagating their species through *many* generations; in that case, there is no *specific* difference between them, and all the different kinds, however various they may be in form, *&c.* are only varieties of the ſheep.

Whereas *different species* of any animal, although they may generate together, only produce a *barren* progeny which naturalists agree in naming mules, which cannot propagate their species through *many* generations; if we are even to give credit to those who pretend they have through two or three, in some singular cases, or rare instances.

Now Dr Pallas had an opportunity of convincing himſelf, that the long tailed, ſhort tailed, fat tailed, and mixed Bucharian breed of ſheep, the four varieties he treats of, all produce a prolific race, when croſsed in every direction, and are *therefore* not different ſpecies.

*The four varieties of domeſtic ſheep, which Dr Pallas examined on his travels, were,*

*1st. Variety,*

Is named both by the Tartars and Ruſsians, *Tſcherkeſsian* ſheep, and by Pallas *dolichura*, or long tailed; it is the *ovis longicauda* of authors.

*2d. Variety,*

Is called the Ruſsian ſheep, by the natives, and by Pallas *brachiura* or ſhort tailed; it ſeems to be the *ovis Icelandicus* of authors, with ſmaller horns.

*3d. Variety,*

Has no fixed trivial name, as its appellations are as various as the provinces where it is reared; Pallas has called it *ſteatopyga* or fat tailed; it is the *Ovis laticaudata* of authors.

*4th. Variety,*

Has likewiſe no fixed trivial name, but Pallas has called it *Bucharian*, from finding it reared by the Bucharian Tartars in immenſe flocks.

### *The first variety.*

*The* TSCHERKESSIAN SHEEP *of the Ruſsians and Tartars, the* OVIS DOLICHURA *of Pallas, and* OVIS LONGICAUDA *of authors.*

This variety is handsome, with a noble air, in its native country and the south of Ruſsia, resembling in its habits, horns, fleece, and length of tail, the Spaniſh, but more particularly the Engliſh ſheep. Its *head* is well proportioned, and of an elegant form ; *ears* straight ; *horns* large, even, rounded in the angles, tapering to a point, and bending inwardly towards the back. The rams are seldom without horns, and the ewes have them often bent in a lunar form.

The *wool* though coarse is without admixture of hair *, and promises to be much meliorated by croſsing the breed, and rearing the animal with more care and ſkill.

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* It appears to me, that the having no hair among the wool is not a specific, but merely an accidental distinction. We know well that among the varieties of ſheep common in England, and every other European country, there are found many which have hairs among their fleece, while it is only the selected *breeds* that have none. This variation, which has probably been at first accidental, like many other varieties among domestic animals, becomes in some measure permanent, by carefully excluding other varieties from intermixing with the selected breed, as will be more fully proved in the sequel of this eſsay. *Edit.*

It is even known to become much finer without the aſsistance of art, merely from the influence of a temperate climate, as on mount Caucasus.

The *tail* of the ram is covered with fine long wool, like the Indian ſheep described by Buffon, which trails on the ground, so as to efface the prints made by the animal's feet on sand; and it contains often twenty joints or vertebræ.

This variety of ſheep seems to have quitted with its coarse fleece and all its native ferocity, in paſsing from the state of nature to that of servitude; as it is the mildest gentle animal poſsible, although leſs degenerated in *form* from the *argali* or *musimon*, the parent animal of the species, than the steatopyga or fat tailed, which has at the same time preserved much more of its wildneſs than the gentle Tscherkeſsian, probably from its ranging with very little restraint the wide plains of great Tartary.

The Tscherkeſsian or long tailed ſheep, (which is always the subject of this article,) is reared in all the European regions of the Ruſsian empire, situated on this side the river Occa,—in the nearer Poland, and by the pastoral people of mount Caucasus; and they are commonly of a white colour.

The same variety, we are told by Ruſsell, in his natural history of Aleppo, is reared under the name of *Beduin ſheep*, by the Arabs, and in the western parts of Mauritania; with a trifling difference in the length and thickneſs of the *tail*. There are likewiſe ſheep in Morocco which belong to this variety, on account of the diſtinguiſhing character of it, *a long tail*, although otherways different in having an ugly look,—*head* covered intirely with hair, little hanging *ears*, and remarkably long wool.

The doctor has himſelf seen ſheep anſwering to the laſt deſcription, in Germany; probably from a mixture of thoſe of Flanders, with ſome foreign variety.

The Indian and Guinea ſheep, ſo well deſcribed by Buffon, reſemble the Tſcherkeſsian only in the length of their *tail*, whilſt in other reſpects, they come nearer the ſteatopyga or fat rumped ſheep of Pallas, in ſize, form, and fleece mixed with *hair*.

Arid burning deſerts ſeem to produce this change on the *wool;* as it is obſerved principally in the Atlantic deſerts near the meridian, from which the ſheep being tranſported to ſtill warmer ſituations in America, have multiplied conſiderably, but moſtly without horns, and have now a covering of *hair* inſtead of wool. As a further confirmation of torrid deſerts turning wool into hair, the doctor cites Shaw's travels, where that author tells us, that the ſheep in the Shara deſert of Africa, are commonly of the height of a doe, and covered with *hair* like that of a dog; and another traveller, the abbé Demanent, aſserts in his new history of Africa, publiſhed at Paris in 1767, that two varieties of ſheep are reared in Guinea, one of which is covered with *wool*, with a long fat tail (the fat probably accidental) whilst the other is larger, stronger, and covered with ſhaggy hair, like a goat. It is very good eating, although the most common, and least valued. Dr Pallas draws a double inference from this quotation from the abbé, *viz*. that the first of the two varieties, which is evidently the Tscherkeſsian, from the *long tail*, ſhows that it is widely dispersed over the earth, more or leſs affected by climate, soil, and sometimes by admixture of other breeds; whilst the second of the abbé's varieties, covered with ſhaggy hair, is another confirmation of what the doctor advanced above, that burning deserts turn *wool to hair:* and here he ends his proofs of that fact, which does not seem to require further confirmation *. Dr Pallas finiſhed the description of this variety, with the following curious piece of information.

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* There seems to be something unsatisfactory in the reasoning here. Were heat of climate the only cause of wool being converted into hair, it ought to operate equally on the two kinds of ſheep here mentioned: and they ought to be both alike covered with hair or with wool. Perhaps in the course of this eſsay, some hints may occur tending to clear up this and other difficulties J. A.

*Tſcherkeſsian lamb ſkins.*

There is a valuable traffic carried on in the north, with the *ſkins* of the Tſcherkeſsian lambs; the beauty of which they heighten in the following manner:

The inhabitants of the Ukrain and Podoli, as soon as a lamb is dropped, (which comes into the world with a pretty wavy ſkin, even without the aſsistance of art,) to augment its beauty, and make it bring a higher price, sew it up in a sort of coarse linen ſhirt, so as to keep up a constant gentle preſsure on the wool, pouring warm water over it every day, to make it soft and sleek; only letting out the bandage a little, from time to time, as the animal increases in size, but still keeping it tight enough to effect their purpose, which is, to lay the *wool* in beautiful gloſsy ringlets, and thereby produce a delicate species of fur, in great request for lining clothes and morning gowns. By this treatment the fine soft wool which rises in the infancy of the lamb, takes a handsome arrangement; and the animal is killed younger or older according to the species of fur intended to be produced, from a ſhort gloſsy nap like sattin, only fit, from its thinneſs, for the purpose mentioned above, to a warm thick fur for a winter great coat. The first of these furs in estimation and price, is a fine black that looks like silk damaſk ; an inferior black fur comes next, much thicker, for *pelices*, or *ſhubes*, as we call the upper winter garb worn out of doors ; and the least in estimation is the whitiſh, except it be of a very pure colour and silky appearance, when it is a rival to the first ; especially for night gowns, a very common dreſs, both morning and evening, amongst the Ruſsians ; particularly in the interior parts of the empire*.

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* It appears from books of ancient travels, that this curious kind of lamb's fur has been long an article of traffic, and in great request in those countries ; and we learn from this instance, that the people are neither inattentive to the elegancies of life, nor incapable of availing themselves, by their ingenuity and application, of those bleſsings that Heaven has thrown in their way.

It appears from these notices, that either there is a diversity of colours among this breed of ſheep, or that the wool is stained, so as to aſsume the colours above mentioned. The first seems the most probable ; for if it were done by art, they could obtain the black furs in any quantities, as well as those of every other colour, if the original wool be of a pure white. It would seem that this fine white is rather uncommon, and that when it does occur it is very much prised.

The silky gloſs here mentioned, has a nearer resemblance to hair than to wool in its usual state. Among the great diversity of breeds of ſheep in this country, there are some which carry crisped wool frizzled up, as it would seem, nearly in the same manner as African negroe's hair. Other breeds carry lank wool, hanging streight

## *The second variety.*

### *The* OVIS BRACHIURA *of Pallas, the* OVIS ICELANDICUS *of authors.*

This variety of domestic ſheep is called the *Ruſsian*, and Pallas has named it *ovis brachiura*, or ſhort tailed. It is reared throughout all the north

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down in locks, nearly as goats hair: while in other cases, though the filaments be parallel to each other, and by no means frizzled in their natural state, yet these locks are gently waved, as if they had been done up by pincers. This is the case with most of the Shetland breed of ſheep. It is probable the wool of the lambs here mentioned may resemble these. It would tend much to the increase of knowledge, could some genuine specimens of these furs, and other ſkins of ſheep of the most valuable breeds in different parts of the world, so dreſsed as to preserve the fleece entire, when at its full growth, be procured, and deposited in the museums of natural history all over Europe; and the Editor of this Miscellany will be much obliged to such of his correspondents abroad, into whose hands this may fall, for such specimens as may come in their way, accompanied with a description of the place where found, the time when obtained, and every other particular that appears to them to be of importance. Nor does he wiſh that this ſhould be confined to ſheep only, but to that of goats also; especially those like the Angora goat, which carry a fleece of great value; as also of the camel tribe, or other domestic fur-bearing animals. He has seen a specimen of a kind of hair, or wool, said to have come from Peru, that is evidently the fleece of an animal of considerable size. The filament has none of that criſpineſs, that is a general characteristic of wool; but it is long, sleek, and gloſsy, like hair, though it has the softneſs of wool, or rather of silk. The longest, and coarsest of that wool measures of Ruſsia, and resembles that of Iceland, in size, tail, and coarseneſs of fleece.

Thus we see that although the northern regions of Ruſsia are little favourable to *wool bearing* animals, yet they boast of a variety of the ſhort tailed ſheep, peculiar to the country, which although resembling the Icelandic in many respects, yet differs from it in a very eſsential character, that of the *horns*, which are much smaller, and have nothing of that exuberance which Buffon and others attribute to the ſheep of that island.

It resembles the Tscherkeſsian ſheep described in last article, in the form of its *head*, straight upright *ears*, and in thickneſs of *fleece;* but the quality of the two fleeces are widely different; as this variety has *wool* almost as coarse as dog's hair: but the great distinguiſhing character between them is the *tail*, which is almost a quarter yard ſhorter than that of the Tscherkeſsian.

The *brachiura* or ſhort tailed ſheep, is reared not only by the northern Ruſsians, but likewise by the

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more than a foot in length, and is of a fawn coloured tinge, resembling that of Vigonia wool, but lighter. The finer parts of the wool are white, and though long, is still ſhorter than the other; and remarkably soft and silky; even more so than Shetland wool. Any notices concerning the animal that carries this fleece would prove highly acceptable. J. A.

Fins and other neighbouring nations. Some of this variety have been transported by the Ruſsians into Siberia, where they have supported themselves on some pastures, though in poor condition; but through all the southern countries, they are in leſs estimation than the long tailed, and fat tailed, varieties, which are much superior to them for size, fat, and good eating. The ewe of this ſhort tailed variety, couples readily with the ram of the *steatopyga* or fat tailed breed, and produces an animal nobler and larger than its mother, with a *tail* swelled at the base with fat, but meagre towards the end, like that of the mixed breed, which makes Dr Pallas's fourth and last variety of domestic ſheep.

The ewe of the *brachiura* (always the subject of this article,) couples likewise clandestinely with the domestic he-goat, and produces an animal much resembling the mother, but with a fleece of *wool and hair* *.

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* Has this fact been sufficiently ascertained? I very much doubt it. In many parts of Scotland the ſheep and goats go together promiscuously at all seasons; and notwithstanding what has been said by Buffon, and other naturalists on that subject, it is a certain fact that no person in these countries, ever saw a breed produced between the goat and the ſheep. This opinion seems to have been adopted merely from the ſhaggy appearance of the fleece of some breeds of ſheep, which much resembles the hair of a goat; but these are found equally in countries where no goats exist, as in those where goats abound. J. A.

The *brachiura* or Ruſsian ſheep, supports very well the severity of a northern climate, and Dr Pallas doubts not but it might paſs the *winter* in the plains of mountainous northern countries, where there is not much snow; nay he even thinks it might augment their hardyneſs and strength, if we are to judge from their habits and treatment of the Iceland flocks, so well described by Anderson in his account of that island.

Dr Pallas remarked that on mountainous pastures, exposed to the sun, such as on the acclivity of the Ouralic chain, the Ruſsian or ſhort tailed ſheep, were larger, fatter, and had a finer *fleece*.

Croſsing the breed with the Tscherkeſsian or long tailed ſheep, likewise mends both the stature and fleece of the *brachiura;* whereas in its own natural state, without admixture of other varieties of ſheep, it is but small, and lean; and produces, in the northern parts of Ruſsia, a wool so extremely coarse, as only to be fit for the cloth of peasants, in a state of vaſsalage *.

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* The coarseneſs of the fleece seems to be by no means a characteristical peculiarity of this breed of ſheep. The Shetland breed of ſheep is obviously referable to this claſs; and it produces the finest wool of any that is yet known. I myself have seen an indefinite number of varieties of this breed of ſheep, each of them poſseſsing certain hereditary and distinguiſhable peculiarities. Some of these carried wool of the finest pile I have ever seen, and softest quality; while others carried wool extremely coarse, and of very little value. It would

### *The third variety:*

### *The* STEATOPYGA, *or fat rump of Pallas; the* OVIS LATICAUDATA *of authors.*

This variety, which has no fixed trivial name, but is differently denominated in every country where it is reared, is both the most abundant and largest breed of ſheep in the world.

It is reared throughout all the temperate regions of Asia, from the frontiers of Europe to those of China, in the vast plains of Tartary. All the Nomade hordes of Asia, the Turcomans, Kirguise, Calmouks, and Mongal Tartars, rear it; and indeed it constitutes their chief riches, the number they poſseſs being enormous. The Persians also rear it in

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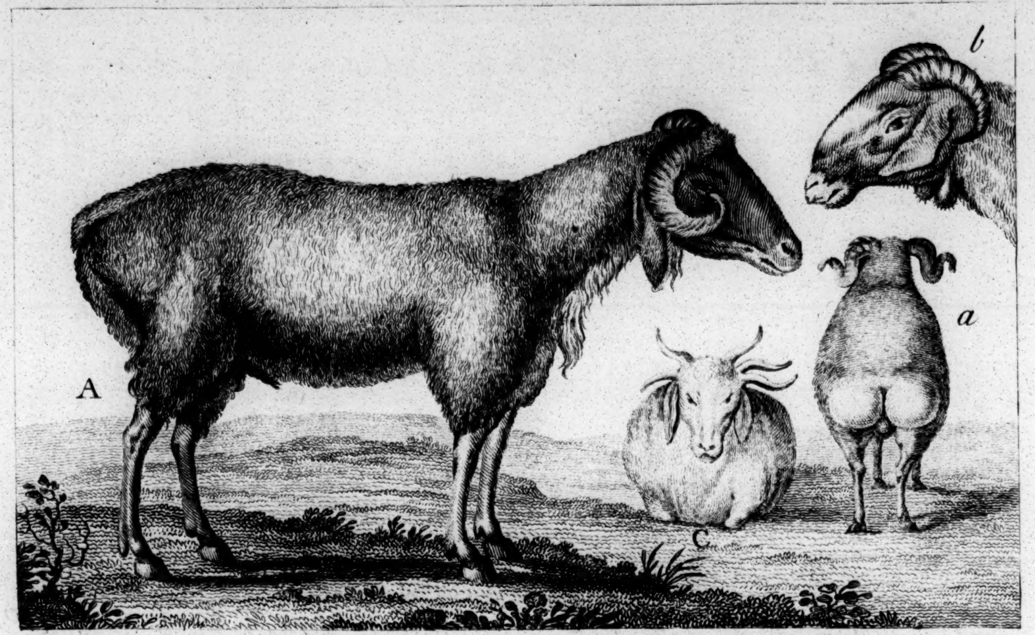
seem that this last breed of this variety of ſheep had chanced to be very generally diſseminated over the Ruſsian empire. Smallneſs of size seems to be a very general diſtinguiſhing peculiarity of this breed of ſheep. The having or wanting horns is by no means a characteristic of it. Neither is the tendency to leanneſs a permanent peculiarity. The fattest ſheep I ever killed was of this breed: it was of a very small size,—had run abroad all winter among a considerable flock, which was not fed for the butcher. It was killed in the month of May. The hind quarter weighed only five pounds and an half, sixteen ounces to the pound, and it gave six pounds of tallow, twenty six ounces to the pound—from which some idea may be had of the nature of the mutton. It was a ewe that had miſsed lamb.

J. A.



Russian Sheep, Plate IInd. THE STEATOPYGA.

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abundance ; as likewise the Hottentots, as we are informed by Kolbe in his travels to the Cape of Good Hope ; whilst Osbeck in his journey to China, aſserts that the *fat tailed* ſheep are reared through that whole empire.

We know from other authorities, *viz.* Shaw, and the abbé Demanent, two writers quoted in a former article, that the same breed obtains in Syria, Mauritania, and the other regions of Africa, under some modifications of *form*, from different causes, so that the doctor thinks he has brought sufficient evidence of what he advanced in the beginning of this article, *viz.* that the steatopyga or fat rumped ſheep is the most universally reared and multiplied of any breed in the world.

Here however the pure *unmixed* race is only treated of, as they exist in the vast deserts of Great Tartary, influenced in their form only by pasturage, soil, air, and water ; no other variety being near to contaminate their blood.

The flocks therefore of all the Tartar hordes resemble one another by a large yellowiſh muzzle, the upper *jaw* often projecting beyond the lower ; by long hanging *ears;* by the horns of the adult ram being large, spiral, wrinkled, angular, and bent in a lunar form.

The body of the ram, and sometimes of the ewe, swells gradually with fat, towards the posteriors; where a solid maſs of fat is formed on the rump, and falls over the anus in place of a tail, divided into two hemispheres, which take the form of the hips, with a little button of a tail in the middle, to be felt with the finger*.

This variety, besides the characters mentioned above, have slender legs in proportion to their bodies, a high chest, large hanging testicles, a large prepuce, and tolerably fine *wool* mixed with *hair*.

Such are the great characteristic marks by which the flocks of all the Tartar hordes resemble one another; but climate, soil, *&c.* produce some small difference on this variety, whether reared by the Tartars, or the Ruſsians, in the western deserts of Great Tartary, from the river Volga to the Irtiſh, and the Altaic chain of mountains. In all that tract of country, the pasturage is mostly arid, and it abounds in acrid and liliaceous plants, in spring, whilst in summer it produces, at least in the open spots where ſheep delight to feed, besides gramen, bitter and aromatic plants, artemisia, camphorosna, and many species of salsola, abounding in juices and salts.

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* See plate second, letter A.

There is likewise found every where an efflorescence of natron, with sea, or glauber's salt; nay even the waters of the desert contain in general the same salts.

Now it is almost unnecefsary to inform European ſhepherds, that such pasturage has the effect of augmenting the *size of ſheep*, if it produces no other change upon them, so that we see in this instance, how some kind of difference may arise amongst ſheep of the same breed, merely from accidental causes, without the least admixture of hetrogeneous blood.

### *Kirguise Tartar flocks wandering in Great Tartary.*

The mode of life of the southern Tartar flocks, may certainly have an influence upon them, as well as on the western just mentioned. It is as follows:

They enjoy a moderate winter with regard to cold, from the protection of mountains, although they paſs it in the open air, with their Nomade masters; living mostly on dry stalks, especially those of the half dry worm-wood, which is abundant in the more elevated situations, that the wind keeps clear of snow.

In the spring, their masters conduct them to pastures rich in rising plants and flowers; and now being come into a most palatable and favourite pasturage, sprinkled with the above mentioned salt efflorescence scattered by the wind, and further impregnated with saline dews, which fall often there in the night, they augment their bulk very considerably during summer, and still add to it in autumn, by the pasturage mentioned above, abounding in salsola and artemisia *.

In these long journies, they are often deprived of water for a considerable time, till they come to some brackiſh well, of which they drink most greedyly. In ſhort the flocks partake both the pleasures and sufferings of their wandering masters, and enjoy almost as much liberty.

However in one respect, they enjoy but a limited portion, that is in illicit and promiscuous amours, to prevent which the Tartars tie about the belly of the rams, some old rags, after† they have covered the ewes at a stated time, so that they may bring forth their young, when every natural advantage awaits

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* Virgil's excellent description of the Lybian Nomade ſhepherd in his 3d book of the Georgics v. 340, answers well to the Tartar Nomades.

——diem noctemque, et totum ex ordine mensem
Pascitur, itque pecus longa in deserta sine ullis
Hospitiis; tantum campi jacet: omnia secum
Armentorius Afer agit, tectumque, Laremque,
Armaque, Amyclaemque canem, Creſsamque pharetram, &c.

† Query, Ought not this to be *before?* J. A.

them. Forty or fifty rams are sufficient for a thousand ewes, and still they are so prolific, that they generally bring two, and often three lambs, at a time; especially when the bandage of chastity has been employed.

Thus the ſheep are fattened from their infancy, and their size augmented: first by great abundance of mother's milk, and then by saline bitter pastures, insomuch that they often weigh in those regions 200 pounds; of which weight, the soft oily fat alone that forms on the rump, independent of suet, amounts to from twenty to forty pounds. The *uropygium* or fat rump, which is made up of this oily species of fat, is so very large as to incommode the animal in walking; but when the same ſheep are carried into the interior parts of Ruſsia, the tail loses half its size and weight, nay sometimes more, from a change in their food and mode of life.

Johnston in his work on quadrupeds, confirms the fattening and prolific effects of saline pastures by saying, "that ſheep become fatter in the maritime salt marſhes of Italy, than on any other kind of pasture."

Some of the hordes of Kirguise on the river Irtiſh, and the Stauropol Calmouks, who wander on the banks of the Volga below Samara, in the government of Casan, rear a breed of the same ſheep, but much diminiſhed in size, in the mountainous country they inhabit, by the want of saline pastures, and by the depth of snow which falls there, that naturally produces a scarcity of winter food, amongst careleſs wandering hordes who do not provide hay.

In those flocks, both sexes are often without horns*.

The same variety, *viz.* the steatopyga or fat rumped ſheep are still smaller with the pastoral Tartars on the Jenisey; and have still leſs fat on the tail, than the flocks alluded to above. Those of the Bouretes come likewise under the last description of diminiſhed ſheep, from the coldneſs of their mountainous regions, where the plants are crude, without saline impregnation, at the same time that the country is devoid of saline efflorescence; and where even water is very scarce. All these wants joined to cold, render the country of the Bouretes very unfit for rearing large sized fat mutton. The Mongal Tartars who dwell near Selenga have ſheep rather larger than those of the three hordes just mentioned; but never of the size of the Kirguise flocks, treated of in page 30. Whereas the transalpine Dauric regions although likewise cold, but exposed to the south, and the genial influence of the sun, produce the largest domestic rams Dr Pallas saw in his whole travels; larger than those of the Kirguise, and not even yielding in size to the European musimon: yet the maſs of fat on the rump or tail is very small; not exceeding much the size of two fists, and seldom weighing ten pounds.

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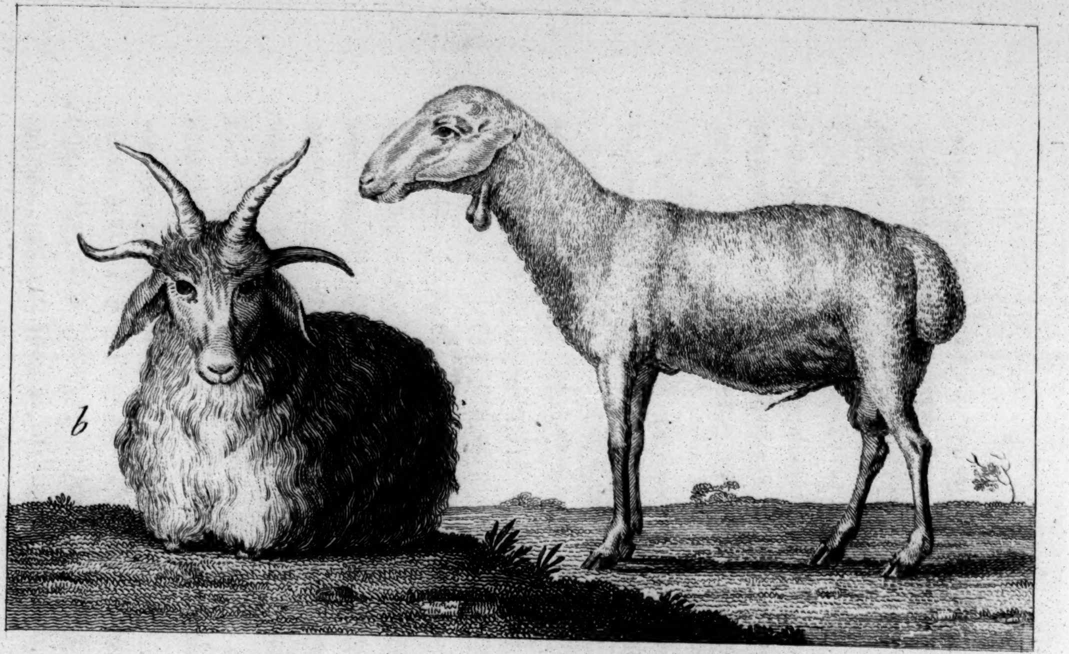
* See plate third letter A.

The reason of this remarkable change in the size of the fat tail or uropygium, seems to be, that there is very little wormwood in that district; and although there are some salt lakes, which produce an efflorescence, yet the pasture is little or nothing impregnated with it, which has so great a ſhare, in Dr Pallas's opinion, in producing that particular species of fat which forms on the *tail.* The plants that obtain there are chiefly leguminous Alpine plants; amongst which the most nutritious are the *astragali*, and a small ſhrub much resembling the *robinia caragana*, which ſheep devour with much avidity, and which has a considerable ſhare in increasing their size. It is likewise neceſsary to add, that very little snow lies on these mountains, and of course the flocks have open pasture all winter; so that it is not so surprising if ſheep which have the same nouriſhment, and pretty much the same range and habits as the musimon or wild variety, ſhould approach them in size, whilst the absence of that load of fat on the tail, so remarkable in the Kirguise flocks in the southern deserts of Great Tartary, is evidently accounted for, according to the doctor's hypothesis, by the absence of its cause, *viz. bitter saline pastures*, which do not obtain in that country.

But it seems, that such pasture alone when unaſsisted by other circumstances, cannot support the extraordinary size of the uropygium ; for when the southern Kirguise ſheep are transported, and breed in the Ruſsian colonies, even in the south of Siberia, where the pasture is pretty much the same as in their own country, they become weak and lean, whilst the uropygium dwindles away to the size represented in table 3d letter A.

This Dr Pallas attributes to the great change in their mode of life and treatment by the Ruſsians; who first of all keep them warm within doors all winter ; next they give them water to drink, instead of letting them eat snow as at home ; and lastly, they deprive them of salt : now the effects of this change of regimen is still more visible in the descendents of the Kirguise ſheep reared in the Ruſsian villages, where the uropygium is diminiſhed to the size of a man's fist, although the little button or tail remains still of its old dimensions, and never increases in them, if the breed is not croſsed with some of the other varietes, which alone merit the name of *tailed* ſheep ; as that of the steatopyga or fat rump, scarcely deserves the appellation.



RUSSIAN SHEEP, Plate IIIrd.

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Here ſhould follow, if I kept strict to his notes, a learned inquiry of Dr Pallas into the *origin of* the *uropygium;* but as, although it would be highly interesting to the physiologist, it does not fall into the plan of this paper, which is meant more especially to convey practical information, I ſhall only mention the conclusions of my learned friend.

He regards the *uropygium* as a fatty excrescence produced originally by the bitter saline pastures of Tartary, which has gradually augmented in size through a number of generations, like some diseases, insomuch that the *tail* has gradually decayed and dwindled away to the little button we find remaining, suffocated in a manner by fat, as parts of the human body have been found decayed and diminiſhed in certain cases of unnatural accumulation of fat*. The doctor likewise says, that the fat which gathers upon the rump of this variety of ſheep, is of a soft *oily* nature, very different from *suet;* which refutes the opinion of those who aſsert, that rumi-

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* The Editor cannot help regretting that his ingenious correspondent ſhould not have thought it neceſsary to give Dr Pallas's opinion at large on this very interesting subject in economics, that has scarcely hitherto entered into the views of the Britiſh farmer; and the observations of so well informed a naturalist must have a useful tendency to direct the attention of the farmer to the proper objects of investigation. There can be no doubt but certain kinds of food and modes of treatment have a tendency to augment the size of some parts of the body of animals more than others. A striking example of this was given in the mode of feeding geese and ducks given in the Bee, (vol. 12th, p. 68,) where we see that, by a particular mode of mana-

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gement, the liver can be increased at pleasure to an enormous size, in proportion to the other parts of the body; and this quite independent of the breed. Now, as some parts of the body are of more value than others, could the farmer, by a due attention to the effects of different kinds of food, and modes of treatment, be able to augment at pleasure the proportional size of the most valuable parts, it would be a discovery of much importance to him. The example above given, is a clear *proof* that this is poſsible in certain cases, and ought to stimulate the attention of the philosopher and the farmer, to discover in how many other cases the same thing may be done. To help forward this inquiry, which has yet scarcely had a beginning, the detailed observations of Dr Pallas will be highly acceptable at any future period to the Editor of this Miscellany.

The attentive reader will here observe, that this inquiry is different from that which the very ingenious Mr Bakewell has so happily commenced for attaining the same end. *His* system consists in effecting the same purpose by means of the *breed;* as by his hypothesis, certain breeds of animals have a tendency to lay more meat on the valuable, than on the coarser parts of the body. An attention to the peculiarities of *breed*, and of *food*, at the same time, promises to produce the happiest effect.

This inquiry is likewise different from that which tends to discover the best mode of treating animals so as to promote the general fattening of the whole body in a ſhort space of time, an example of which was also given in the Bee, (vol. 15th p. 73.) in regard to the management of poultry; where an economical practice of very great importance is developed with much perspicuity. J. A.

nating animals never generate any other species of fat but suet*.

Immediately after the last inquiry, the doctor enters upon a second learned disquisition on the *tail* of the Boucharian ſheep, which make his fourth and last variety: but for the reasons urged before, I ſhall content myself with merely giving the substance, when I enter on the next article, to which it properly belongs; at the same time that I am convinced the anatomist and zoologist will be much pleased with the whole.

The doctor next proceeds to ſhow that a defect or disease in ſheep, may be transmitted through many generations; gives a figure of one, where a defect in the nose of a ram, poſsibly at first accidental, is transmitted to a whole breed; as is a hump on the back of another race of ſheep, reared with much care in Persia. Dr Pallas pursues the same subject of hereditary defects in other animals; and mentions a race of dogs in Persia and India, without either hair or tail; next he points out defective breeds of fowls; and lastly, a race of *cats* at Amboyna, with ſhort stumpy tails, as if docked by art, like coach horses in Britain some years ago*.

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* Those who are well acquainted with full fed old Scotch mutton, and Highland beef, know very well, that there is abundance of fat interspersed among the fleſh of both these sorts of meat, extremely different from suet. J A.

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* Here we must again regret that Dr Pallas's observations on this very curious subject ſhould not have been pursued at full length, as this is a disquisition of the utmost importance in domestic economics; for if valuable peculiarities among animals, which come at first from accidental circumstances that cannot be accounted for, are capable of being perpetuated through the breed by procreation, it gives a range to amendment, and a stimulus to attention in domestic economy, that may be in time productive of wonderful improvements. Though such disquisitions therefore appear at first sight matters of mere curiosity, this ought not to discourage the inquirer; for these inquiries may lead to very useful consequences. From these considerations a few facts on this subject that have come to the knowledge of the writer of this note ſhall here be stated.

That certain peculiarities both of mind and body, are in some degree hereditary, even in the human species, there can be no doubt; not to mention some diseases universally allowed to be so, and the acknowledged similarity which usually prevails among the individuals of the same family, called a family likeneſs. It is equally well known, that certain families have been distinguiſhed for a peculiar cast of mind, or bent of genius, for ages in succeſsion. The permanency of the breeds of dogs, cats, cows, and horses,—fowls, and other domestic animals, when not adulterated by intermixture with others, is also notorious.

This seems to be indeed so universally the case, that we account it perfectly natural. But instances, like those that Dr Pallas mentions, of peculiarities which were known to be at first accidental only to the individual, being propagated through the progeny, have been seldomer observed, and have not much attracted the attention of mankind; yet, by a careful attention it will probably be found that this happens oftener than is usually imagined.

Deformity, and even a preternatural number of horns in ſheep, and other animals, the doctor evidently ſhows, by numerous examples, highly curious,

A cat, now in the poſseſsion of one of the profeſsors in the univerſity of Edinburgh, was, when young, perfectly complete in all its parts, but by accident lost its tail by some violent stroke; this animal has had several litters of kittens, and it has invariably happened that some individuals of every litter have been without tails; sometimes nearly one half, while the others have had tails. It remains to be tried, if a male and female of those tailleſs cats, would invariably produce tailleſs cats, as a hornleſs cow and bull produce hornleſs calves. This cat is still in life.

A more singular instance of an accidental blemiſh becoming in some degree hereditary, occurred with regard to a bitch belonging to a merchant in Leith now alive. The bitch had one eye knocked out; a considerable time after which, ſhe had a litter of puppies, one of which had the eye on that side of the head which was blind in the mother, blind also, in every respect resembling that of the mother.

Another gentleman of my acquaintance has a breed of rabbits, having only one ear; which must probably have been at first only an accidental deficiency. I have also seen a breed of fowls without a tail, that has probably had a similar origin.

Let me add to these instances among brute animals, another somewhat of a similar nature in the human species. The writer of this article was, when young, endowed with a very acute sight; and in particular could see objects at a greater distance than most persons he met with; but when he was between twenty and thirty years of age, in consequence of some internal disorder, of which neither he nor his physicians could give any account, his eyes became tender, and he lost his eye sight in part by degrees, so that he thought he was in danger of going entirely blind. He never suspected that he was become ſhort sighted, till an accidental circumstance discovered it.

may be likewise transmitted by propagation; but they are much too voluminous for this paper. However his important conclusions from the whole of the curious facts he has brought together, are: That much depends on the ſkill and care of the ſhepherd, to *meliorate the wool* of his flock, and correct the form of his ſheep when defective: nay, he aſserts that it depends on his choice of breeding ſheep, to effect not only the change already mentioned, but likewise, either to correct or propagate *defects*, and even multiplicity of *horns*, particularly by his choice of rams.

Dr Pallas thinks it very probable, that the strepsiceros variety of ſheep, were produced in this manner, by propagating a particular configuration of horns; he alludes here to the animal which Bellonius first discovered on mount Ida in Crete, and which he supposes the strepsiceros of the ancients*.

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This was, to him, a great discovery indeed: for having fitted himself with concave glaſses, he now sees at a *distance* as well as ever, and poſseſses without them, the usual perfection of vision as to near objects. Now, though no one of his predeceſsors, or those of his children on the mother's side, were known to be ſhort sighted, it chances that several of his children have the same defect of vision, and are obliged to use concave glaſses to view distant objects. J. A.

* Our learned naturalist acknowledges in a note, an error he had fallen into, in supposing the strepsiceros of Bellonius the

On the subject of multiplicity of horns, Dr Pallas remarks, that there are no where so many ſheep with four, and occasionally five horns, as amongst the flocks of the Tartars living on the banks of the Jenisy. They are likewise generally arranged with symmetry, rising from the head in radii, gently bent inwards, and scarce a foot long, as represented in plate second letter *c.* and plate third letter *b.* The first is a drawing of a large Kirguise ram with five horns; the second is a ram from the banks of the Jenisy, with four, symmetrically arranged. On the authority of Mr Leigh in his history of Lancaſhire, Dr Pallas mentions a breed of large ſheep in England, with *hair* instead of wool, and four horns; the upper pair like those of a he-goat, the lower spiral like those of a ram; probably the breed came originally from Iceland, where we are told such ſheep obtain; and he finiſhes the article by bringing evidence of multiplicity of horns, in the extremes of both heat and cold, although he thinks a severe

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Scythian antelope or *saig*, whilst we now know that animal never approaches Europe, nearer than the deserts of Arabia. "I have since, says the doctor, learned from the inspection of its horns, that there exists a variety of ſheep in Pannonia with horns often a yard and a quarter long, in both sexes, exactly like those so well described by Bruickman in his account of the Hungarian ſheep."

*Epistol. Itiner. Cent.* 1.

cold climate, leſs favourable to luxuriancy of this kind, than an exceſsive hot one, judging from the number of cows he met with in the *north*, *either intirely without horns, or with remarkably small ones.*

He pursues the subject of *horns*, by informing us that the Mongal Tartars rear in general goats without them, to prevent them wounding one another in their battles, which they effect by never admitting into their flocks a he goat with horns.

As to ſheep, if the ewes have them, although the rams are without horns, the lambs will have them; but if both parents are without these weapons of offence, their progeny will generally be so too.

Dr Pallas next treats of the *ears* of this variety of ſheep, and of other animals.

The form of the *ears*, like that of the head, is constantly pendulous in the steatopyga, or fat tailed variety, and are either bent forward, so as to meet on the forehead, as in plate third letter *a*, or they hang down towards the ground; and are always larger and looser in this variety of ſheep than in any other (see plate second letters A, C.) The first of these positions is applicable likewise to the ears of the Nomade goats; and he remarks that *pendant ears*, are common to domestic animals in general. Here he finiſhes the subject, except mentioning in a note a breed of favourite lady's cats at Pekin in China, with *pendant ears*, and long loose white hair, which are very bad hunters of mice in general*.

The learned academician then treats of a species of *ſkinny appendage*, hanging from the necks of certain varieties of ſheep.

There are amongst the Calmouk, but more commonly amongst the Kirguise ſheep, some that have two pieces of ſkin, hanging from the under part of the neck, like the Guinea ſheep, (see plate second *b*, third *a*,) which the Latins of the middle age called NONEOLA, and which the Ruſsians call SERGY or earrings. They resemble small cows udders, or rather dugs, soft, about an inch and an half long, and the breadth of a finger. Sometimes they are covered with hair, and sometimes almost bare. Both sexes have them; and they are equally common to the Kirguise he goats as to the ſheep. Dr Pallas quotes in a note an aſsertion of Varon, and Columella; that two of these warts are a mark of a good he goat; and concludes his observations on this variety, by observing, that although the steatopyga breed of ſheep, surpaſses all the others in size of carcase and fat, yet it ranks amongst the lowest of the species in regard to *wool*, as it bears a very coarse sort mixed with *hair*, throughout all Asia, whilst the famous Kirguise breed, are covered with more hair than wool; at the same time that it is matted together in clots.

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* Some cattle are found in the north of Scotland, having loose pendulous horns, that adhere to the head by a cartilaginous appendage. These horns are always of a small size. Cattle having this peculiarity are distinguiſhed in Aberdeenſhire by the local appellative *scurr'd*, as a scurr'd, ox or cow. J. A.

Some flocks of this variety, particularly those belonging to the western Nomades, have long hair, which rises above and covers the wool, and is undulated like that of a deer.

On the whole, Dr Pallas thinks that the melioration of *wool* in the *steatopyga* or fat rumped breed, is incompatible with such a regimen as is calculated to support or maintain them of the large size they acquire in the southern Tartary, with the extraordinary load of fat on the rump or tail; as we see that any change in their mode of life diminiſhes both.

Dr Pallas, on the subject of wool, combats an opinion of Aristotle, that its fineneſs depends on the tenderneſs of the ſkin from which it rises; and offers the fleece of this very variety of ſheep, as a refutation of the doctrine; for the uropygium, throat, and belly, where the ſkin is thinnest, are covered with coarse hair instead of wool. He then offers his own opinion on the subject, which is, that the quality of wool depends on the state of the fleſh, and cellular substance, rather than the ſkin; as we see in *wild beasts*, that the leaner animals have the fineſt gloſsy hair, whilst those with an oily ſkin, such as the hog, the phocus, and the bear, have the coarseſt of all species of hair, under the name of bristles*. The temperature of climate the doctor thinks, and even can aſsert from his own observation, has considerable influence on the quality of wool; nay the *extremes* of heat and cold, have so powerful an influence as to turn wool to hair†.

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* I ſhould suspect, that here also no general rule could be eſtabliſhed. The martin and all that claſs of animals which are known to carry fine furs, are not remarkable for leanneſs; and the beaver in particular, whose wool is the softeſt as well as the closeſt of the furred tribe, is remarkably fat; We know also, that among the various breeds of ſheep in this island, there is no sort of connection observable between the tendency to leanneſs or fatneſs, and the fineneſs or coarseneſs of the wool. It is neceſsary we ſhould guard cautiously against general conclusions from particular facts, as that might lead to very material errors in practice. J. A.

† I ſhould demur to this conclusion also. It is proved by experiments that have been carefully made, that the thickneſs of any filament of wool is affected by the heat the animal has suffered at the particular period that filament was produced; the part of it produced during hot weather being always coarser than that which grew during the prevalence of cold weather. From partial facts, picked up in general reading, it would seem, that in general, warmth of climate had a tendency to render the fleece thinner than it would be in a cold region, or to incourage the growth of hairs, that are to be found

Our author, after closing the subject of the steatopyga variety of ſheep, enters into a learned inquiry into the cause of colour in animals, and the changes wrought on their different hues, by climate, pasture, water, and certain artificial methods, such as giving powder of antimony, or the catkins, (amentum,) of nuts, with their food, as is practiced in Ruſsia, to change a plain colour to a dapple.

Amongst the *natural* causes of the change of colour in animals, he calls in the authority of several ancient writers to prove, that particular waters have that effect; and thinks that certain pastures must have no leſs, if we are to believe a fact aſserted in Rajus's philosophical letters, p. 245. " That there is a hill named *Haselhedge**, in the

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among the wool of many ſheep, in preference to that of wool; but even these facts are not yet fully proven. I have never met with any fact that indicates any other change upon the fleece of ſheep by climate. As to the circumstance of coarse wool being found on the ſheep in some northern regions, it may be merely accidental; the original breed of ſheep found there perhaps having produced wool of that quality, and thus have been propagated there *by kind.* The coarsest wool in Britain is found in Cornwall, the southermost part of the island, the native ſheep of which are said to produce a fleece liker hair than wool; and the finest is found in Shetland, the northermost part of the Britiſh dominions. J. A.

* I cannot paſs over the curious quotation of my learned friend Dr Pallas as given above, without taking notice of the singular coincidence

peak of Derbyſhire, which changes the colour of a cow from white to grey in three years*.”

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between the name of the Derbyſhire hill, and the mode of changing the colour of horses in Ruſsia and Poland, with *the catkins of nuts*. It would be curious to inquire if the said hill abounds in *hazel*, as its name seems to have once indicated. *Arcticus.*

* We must again regret that the disquisitions of this celebrated naturalist on this very curious subject, have been curtailed. Though I fear, that till experiments ſhall have been made with the accuracy of modern philosophers, we must pay little respect, to the ill ascertained facts that have been accidentally preserved by natural historians; many of which have been taken from hearsay alone, and we know that in *this way*, wonderful changes have been effected. Has it ever been proved, by well ascertained *experiments*, that the colour of the *hair* of animals can be changed at pleasure by the nature of the food? I have never fallen in with these experiments. At the same time there is good reason to believe, that this may be poſsible; for it is well known, that we can artificially change at pleasure the colour of the bones, and in some instances particular parts of the fleſh of animals, by a particular kind of food. By analogy therefore we may believe that the *hair* may also be thus affected; but I have not heard of any fact but that above stated that proves this. It is known that one kind of hares, and many other animals, change their colour in winter in cold regions. This has hitherto been intirely ascribed to the rigour of the season. It is not however impoſsible, but the nature of the food they must then feed on may contribute somewhat in effecting this change.

There are some particulars respecting the fur of animals that have not attracted the learned doctor's observation in this diſsertation, nor that of any naturalist I have as yet met with, which I ſhall here beg leave to bring under the notice of the reader.

From whatever circumstance the diversity of colour among domestic animals arises, there seems to be certain peculiarities invariably

Dr Pallas treats likewise at the end of his third variety, of the curious phenomena of *hair balls*, found in the stomach of ſheep and other animals. He begins by informing us that the flocks of none of the

connected with some colours, that do not attend others: For example the hairs of a *white* horse adhere to the ſkin much more loosely than those of a bay, or chesnut, or other dark colours. Hence the clothes of the rider are much more copiously filled with the hairs of a white horse than that of any other colour.

In general white cattle have a much thinner coat of hair than cattle of a black or dark brown colour.

But the most singular and invariable peculiarity of this kind I have ever observed, is that of a kind of *lead* coloured cattle I have seen in the Highlands. These do not so much abound as those of darker colours; but they have *invariably* a smooth sleeked gloſsy hair, very much resembling the gloſs of silk. I never saw one of those that were not thus diſtinguiſhable, even while going in the same herd with cattle of black and other colours whose hair were of an opaque dry like appearance.

I do not recollect ever to have seen a gloſsy black wool, where the fleece consisted entirely of black filaments, nor have I ever observed either very fine or very soft wool of that colour, though I have often remarked that in certain breeds of ſheep I have seen in the Highlands of Scotland, that carry what we call gray, or sometimes blue wool, consisting of a mixture of white and black filaments. In that case the black filaments intermixed with the white have a clear bugle like lustre, and great softneſs, so as to make the fleece when nearly examined appear of a clear silver grey colour.

These remarks might be much extended; but the above may serve at present to direct the attention of the careful inquirer to this subject.

J. A.

Tartar hordes are so much subject to them, as those of the Kirguise and Kalmouks. They are seldom made up of their own wool, but of grey coloured *camels hair*; and seem to have the following origin.

The camels, besides feeding on ſhrubs, or spinose and asper plants, are particularly fond of saline vegetables; and sustain themselves in some parts of the Tartarian deserts, intirely upon salsolis, halimo, and such like plants.

They likewise lick up the saline efflorescence so frequently found on the earth in these countries; and by these means, their fluids become so fully saturated with *salt*, that after perspiration, their hair is as if it was powdered with salt.

The ſheep, which are equally fond of that mineral, lick it off the ſkin of the camel with much avidity, and with it swallow the loose hair of their coat; which forms one or more balls in the stomach, as the operation has been repeated in different seasons. These camels-hair balls are from the size of a walnut to that of an egg, commonly either round, or a little concave from being preſsed in lying.

This species of ball is seldom incrusted with tartar, although another kind to be described below are commonly covered with that matter.

The doctor finiſhes the subject of *hair* balls, by mentioning in a note, his having seen, when in London about the year 1762, at the house of the celebrated naturalist Mr Henry Baker, a roundiſh ball of soft white wool, the size of an orange; one of six found in the stomach of an Engliſh ſheep.

Cows likewise form hair balls in the stomach in all countries, and the doctor is in poſseſsion of one taken out of the stomach of a *turky*, consisting intirely of *horse hair*.

The other kind of ball alluded to above, often found in the stomach of the Tartarian ſheep, is composed of dry maſhed twigs, sometimes of the size of a man's fist, though generally smaller and of an oblong form.

This species of ball is often found covered with a thin coat of tartar, of a blackiſh colour; and occasionally with a stony incrustation.

Their smell, which does not quit them for a length of time, much resembles that of bezoar; and Dr Pallas thinks they take origin from the dry twigs of wormwood on which they feed in winter, incrusted with tartar, formed from a mixture of vegetable juices, with the gastric liquor and saliva.

The grinders of this variety of ſheep are likewise covered with a coat of yellow coloured tartar, generated probably in the same manner.

## *Description of a* KIRGUISE RAM *of the* STEATOPYGA, *or fat rumped variety.*

This ram was not of the largest size.

*Head*, was rather leſs than many others of the same variety; and all black, even to the horns.

*Ears*, pendent and black, except the outer rim, which was spotted with white, as were the legs.

*Throat*, covered with greyiſh hair; the rest of the animal white.

*Horns*, spiral.

*Uropygium*, very large, and divided into two hemispheres.

*Anus*, filled with fat; or rather stuffed with it in all parts.

*Scrotum*, covered with hair.

*Prepuce*, large.

*Wool*, coarse, and some inches long on the back, sides, and extremities, whilſt it is mixed every where with hair.

### *Weight.*

| | *Medical Pounds.* |
|---|---|
| Total weight of the ram before cut up or ſkinned, - - - - - | 193 |
| The carcase without ſkin, head, and bowels, | [*] 179 |
| The fat of the uropygium and anus, - - | 38 |

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[*] I suspect there may be an error here. In the copy it was 79, which is evidently erroneous. J. A.

*Measurement, in French feet, inches, and lines.*

| | *f.* | *i.* | *l.* |
|---|---|---|---|
| Total length from the upper lip to the fissure of the uropygium or fat rump, | 5 | 2 | 0 |
| *Head*, length from the upper lip to the horns, | | 10 | 0 |
| Ditto from ditto, to the nape of the neck, | 1 | 2 | 0 |
| Circumference of the muzzle measured over the nostril, - - - | | 8 | 6 |
| Ditto of the face between the eyes and ears, | 1 | 1 | 1 |
| Ditto of the head, just below the horns, | 1 | 7 | 0 |
| Distance between the angles of the eyes, - | | 5 | 4 |
| Ditto between the eyes, and ears, - - - | | 2 | 3 |
| Ditto between the horns and eyes, - - | | 1 | 0 |
| Ditto between the nostrils - - - - | | | 8 |
| Ditto between the eye and lip, - - | | 7 | 1 |
| *Ears*, length of, - - - | | 6 | 11 |
| Their greatest breadth, - - | | 4 | 4 |
| Ditto, circumference at their base, - | | 4 | 1 |
| *Horns*, their length following their curve, | 1 | 7 | 7 |
| Circumference at their base, - | | 6 | 10 |
| Distance between them in front, - | | | 8 |
| *Neck*, circumference at the ſhoulders, - | 1 | 8 | 10 |
| Ditto at the head, - - | 1 | 4 | 2 |
| *Trunk*, circumference at the fore legs, - | 2 | 11 | 6 |
| Ditto at the largest part of the middle, - | 3 | 3 | 0 |
| Ditto at the hind legs, - - - | 3 | 0 | 0 |

## *The Fourth Variety,*

## *THE BOUCHARIAN SHEEP.*

This variety, raised by the Boucharian Tartars and Persians, in great numbers, Dr Pallas regards as a mixed breed, from the union of his first and third varieties, *viz.* the long, and fat tailed ſheep.

This fact, the particular configuration of the *tail* seems to indicate, as it is made up of those of its two parents ; (see the article uropygium below.)

The ſheep of this variety which the doctor saw in his travels were only two years old, and of course not at their full growth ; but he thinks they could never obtain the size of either of their parents, the *dolichura* and *steatopyga*, or even become much larger than the common Ruſsian ſheep, or *brachiura* of our author.

*Head* is like that of the Kirguise; but the muzzle is ſharper, resembling the Indian ſheep of Buffon, (vol. 23d plate 3d. f. 36.)

*Body*, rather smaller than that of the Kirguise ſheep.

*Ears* large and pendant.

*Uropygium.* They have a small one like that of the Tartar ſheep on the Jenisy, especially when begotten by a Kirguise ram; but in general they have a

*Tail*, fat and broad at the base, with a long narrow appendage ; this last addition resembling the tail of the Tscherkeſsian ſheep.

*Grown ſheep.*

*Wool* compact and thick in the grown ſheep, soft, elastic, and elegantly formed into frizzled circles.

*Lambs.*

In the lamb it is formed into delicate little circular waves, as if preſsed close to the ſkin by art, but when taken from the mother, or killed immediately after birth, they are still more beautiful, and often elegantly marbled, with feathered waves like silk damaſk.

These three furs are the finest and most precious of the kind known to Europe and the east ; they are brought to us by the Boucharian Tartars and Persians, who sell them dear. The most prized are the *blue*, the black, and the silver grey ; but of the *unborn lamb ſkins*, as the fine gloſsy thin furs are called, which so much resemble silk damaſk, the fine black is dearest and most esteemed.

To obtain these valuable furs, the Boucharian Tartars purchase whole flocks of male lambs *, just dropped from their mothers; as to kill a female till past the age of breeding, is held as a kind of crime by all the Tartar hordes; such is their reverence for an animal which constitutes their greatest riches, and the propagation and care of which is the great busineſs of their lives; so that all the furs we see of this species sold by the Tartars, are from young rams †.

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* The circumstance of the Boucharians purchasing whole flocks of lambs accounts for the doctor's having not seen any full grown ſheep of the Boucharian variety, and for their being all about the same age, viz. two years ; that appeared an extraordinary case to the author of the paper, who forgot to demand an explanation from Dr Pallas. *Arcticus.*

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† There is a peculiarity respecting these ſheep that deserves to be taken notice of here; *viz.* the singular beauty of the furs of the new dropped lambs; which affords a clear proof that the wool is quite free from hair; for it is observable among the ſheep of Britain, that when any hair is among the wool, that ſhows itself at the birth of the lamb; as it is then more fully grown than the wool, and makes the fleece of an unsightly ſhagged appearance.

Every particular in the description of these ſheep seems to indicate, that they are a breed eſsentially distinct from any of those reared in Europe; and that the fleece is of a nature totally different from theirs in some very important particulars. The most universal quality of European wool is that it is crisped or frizzed, somewhat of the nature of negroes hair. Even the kinds of wool that we distinguiſh by the term *lank*, and which sometimes hang in locks, is in no case free of that kind of crispineſs. From the gloſsy silky like appearance of these furs, it would seem that this peculiarity is there totally wanting. Calves, and other animals of this country, bearing hair, are found in the uterus, when the mother is killed during an advanced state of pregnancy, covered with ſhort gloſsy hair, that lies close to the ſkin, and is much more beautiful than that of the same animal after birth. This seems to be much the case with these lamb's ſkins. On the whole, it seems to be a valuable

The Boucharians are of opinion that art is neceſsary to preserve these furs in their greatest beauty; and in that idea keep the lambs under ſhades, *&c.* during the meridian ardour of the sun: but Dr Pallas has reason to think that these precautions are uſeleſs; as he observed that the same variety of ſheep produced the same fine furs, equal in every respect, without any sort of care, in the hands of the Kirguise Tartars.

He therefore imagines that it would be well worth the attention of Europe, to transport this breed of ſheep, and make experiments on the valuable fur they yield; which might probably be much meliorated by the ſkill of the expert and industrious Europeans.

Here follow the reasons for the doctor's supposition, that the Boucharian variety are descended from

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breed of ſheep totally unknown in Europe; which if better known, might perhaps prove highly advantageous in agriculture and arts: but we are as yet too little acquainted with it to be able to say in what respects it could be most beneficially employed. It is therefore a fit object of experiment.

There are many difficulties occur respecting the idea of this being a mixture between the fat rumped and long tailed ſheep; especially if the hairy fleece, and clotted fur be admitted as invariable characteristics of the fat rumped ſheep: for nothing of that sort appears in this breed. The fur indeed seems to be finer than that of the Tscherkeſsian ſheep itself. This subject ſhall be resumed at an after period. J. A.

a mixture of the long and fat tailed ſheep, whoſe wool is meliorated by the climate ; they are principally drawn from the figure and composition of the *tail* (as described in page, 54 ) and the great resemblance between them and the mixed race the doctor saw in Siberia, as mentioned in his second variety, produced by croſsing the *fat*, with the *ſhort* tailled or Ruſsian ſheep ; and with another breed of mixed ſheep he met with among the Krasnojark Tartars.

The same variety which makes the subject of this article, is likewise raised in great numbers by the Persians ; and it is more than probable if we are to give credit to authors, ancient and modern, that this very variety obtains in Syria, Palestine, and divers countries of Africa, known to them by the name of *ovis macrocereas* *.

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* The wools of Persia and of Caſhemire, have been long esteemed the finest that are brought to the European market ; and for many centuries past, have sold at the highest price. In the year 1719 Pierre Ricardo, in his *Traite le Negoce d'Amsterdam* states the price of wools in that market as under :

Wools of Germany from 7 d. to 11 d *per* pound.

Wools of Poland from 9 d. $\frac{1}{2}$, to 1 s. 0 $\frac{1}{2}$ *per* ditto.

Wools of Persia or Caramania. { White from 3 s. to 3 s. 6 d.
Red —— 4 s. 1 d. to 4 s. 3d.

Spaniſh from 1 s. 2 d. $\frac{3}{4}$, to 3 s. 10 d. $\frac{1}{2}$.

About that period the best Engliſh wool sold for about 8 d. $\frac{1}{2}$ *per* pound. *See Anderson's observations on National Industry* p. 247.

It differs in all those countries from the fat tailed or *steatopyga* of Pallas, in having a *long tail*, fat and broad above, with a long narrow appendage, which is exactly the great marked character of the Boucharian breed. Pliny tells us, that the Syrian ſheep have *long* fat tails, and carry wool; and by Ruſsell's account of them in his Natural History of Aleppo, they resemble the Kirguise ſheep in the *head*, *face*, and *ears* hanging on the cheeks; but the *tail* is that of the Boucharian, fat above with a long lean appendage: he adds, that they are covered with a soft wool, which is another trait of resemblance with our present variety; and that they weigh sometimes an hundred and fifty pounds, one third of which is the weight of the *tail*. Gesner, in his work on quadrupeds, tells us that the Arab ſheep of Kay, have nearly the same characteristic marks; especially with regard to the *tail*.

Shaw relates in his travels, that ſheep with such a compound tail, are common in Mauritania, and in all the east. Whilst Kolbe aſsures us, that the ſheep which are brought on board the ſhips at the Cape of Good Hope, have tails weighing twenty-five or thirty pounds, fat above, with a bony appendage hanging from it; and lastly the abbé Demanent, in his new history of Africa, mentioned in a former article, says that ſheep are found in Africa covered with *wool*, and with such a tail as we have been describing ; whilst at Cape Guarda in the south of Africa, all the ſheep are white, with rather small black heads, otherways a large handsome breed *with broad fat tails, six or eight inches long.*

The doctor however does not entirely close his proofs here ; for he quotes several paſsages from Moses in confirmation of what he has advanced, viz. *that the Boucharian ſheep obtain of Syria, Palestine, and divers countries in Africa :* but as I find that in our translation of the Bible, the ſheep mentioned by Moses, are rather the fat rumped than the Boucharian, I have contented myself with giving merely his references, without making any extracts from Holy Writ. That the curious may consult the original Hebrew, they are :

Moses book third, chapter eighth, verse twenty-fifth ;—and chapter ninth, verse nineteenth.

But it is probable the doctor took his quotations from either the Latin or German versions.

### *The fifth variety.*

### *Ovis Taurica.*

THERE is still a breed of ſheep in the *Crimea*, (lately brought back to its ancient appellation of *Tauride* by her imperial majesty,) which even the wide range of Dr Pallas's travels did not permit him to examine, but which he hopes to deſcribe on his journey home from the new excurſion he is going upon for the advancement of natural history in general, and the completion of his Flora Roſsica in particular; a splendid work executed by the learned academician, at the sole expence of her imperial majesty, who presents it to the learned in Europe, as a mark of her attention to science, and its profeſsors.

The doctor thinks it must be a variety of the steatopyga, or Boucharian ſheep; but what we know for certain, and what makes it highly interesting is, that a valuable trade is carried on with its ſkin; as it furniſhes the beautiful and high priced blue furs, in such great estimation as a winter dreſs for the nobility of Ruſsia, Poland, and other northern countries. It is impoſsible to paſs over the *blue* furs of the north, without calling to mind a race of ſheep mentioned by Boethius and Sibbald, as inhabiting the island of Rona, and bearing a *blue fleece*, similar to what is so much prized here.

It might be worth the curiosity, if not the interests of your society, to inquire if any traces of the breed remain, on that or any other island of Scotland*.

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* The ingenious writer is here led into a dilemma, from the equivocal meaning of the word *blue*, in the Scottiſh dialect of the Engliſh language, when applied to animals of this sort. Nothing is more common than to hear country men talk of *blue* horses ; but a horse literally of a blue colour, in the strict meaning of the word, was never I believe seen in this country : at least I know that I have seen thousands of blue horses, as they are called ; and these are all literally gray ; consisting of mixed hairs black and white : when it has a reddiſh glance, it is called iron gray. The blue ſheep of Scotland are precisely of the same sort. The fleece always consists of a mixture of white and black hairs having a bluiſh glance ; as I have seen thousands of times.

On the other hand, the blue furs of Taurica here mentioned, or at least some furs which I have seen, are of a bright blue colour strictly so called, exactly of the same cast with the blue cloths of Europe that have been dyed with indigo; and I am convinced these have all been so dyed,—and that there is no ſheep to be found any where that are naturally of that colour : at least I have never seen any such, nor heard of any well authenticated fact to make me believe that there are any such. The blue ſheep of Rona mentioned by Boethius, I have no doubt were of the same kind with the ſheep called blue at this day by the natives, of the kind above described, which are to be found in all the remote parts of Scotland I have visited, where large flocks of ſheep are not kept, and where of course little attention is paid to the breed. J. A.

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A second variety of ſheep mentioned by the same authors, bearing a fleece composed of *wool and hair*, is probably that which has lately drawn so particularly the attention of your society for the melioration of Britiſh wool; as I understand that the fine woolly down, which seems to ſurpaſs every thing of the kind on your side Thibet, is hid by long hair which rises above it, and serves as a covering to the animal whilst deprived of its finer under coat. The festival of the island, must then be at ſheep *pulling*, not at ſheep *ſhearing* as in England.*

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* There is, I believe, no variety of ſheep reared in any part of Britain among which there may not be found individuals whose fleeces contain a mixture of hairs; nor is there any county, or any breed among which individual ſheep may not be found that have no hair among the wool at all. In some places however hairy wool is common, and nearly universal, and in other places clean wool is equally general, and a hairy fleece a rarity.—In general, wherever the farmers have been for a long time past attentive to the quality of their wool, the hairy sort is rare, because they have taken care not to breed from that kind; and wherever no attention has been bestowed to the breed, hairy wool is very common.

In Shetland, from what I have heard and seen, hairy wool is common, for no other reason than that they have hitherto bestowed no attention to their breed of ſheep; but fortunately it is not *universal*, as some fine woolled ſheep are still to be found there that have no hairs at all among their fleece. From all these facts, I am far from admitting, that hairy wool is a peculiar characteristic mark of distinction of any one breed of ſheep whatever, though doubtleſs in some districts, and in some particular flocks in these districts, that kind of fleece abounds much more than in others. J. A.

A third variety of ſheep mentioned by the same old writers, and so much laughed at, was one with a yellow fleece, and teeth of the colour of gold. But, Mr Editor, as we find *two* of the three varieties do exist in nature, it is but fair, before we condemn our venerable authors as fabulous, to see if it is poſsible to account for ſuch a phenomenon from natural cauſes.*

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* In all the remote parts of Scotland and the isles, where ſheep have been in a great measure neglected, and allowed to breed promiscuously, without any selection, there is to be found a prodigious diversity of colours, and among others dun ſheep,—or those of a brownish colour tending to an obscure yellow, are not unfrequent. These I have often seen; and these, I have no doubt, are the yellow ſheep of Boethius. But a bright yellow ſheep, resembling the clear yellow colour obtained on pure white wool by means of weld, I never saw nor heard of; and believe none such exist more than of the blue.

When any variety of these ſheep becomes a favourite with a particular person, those of that colour are selected to breed from; and in this way it frequently happens that those of one colour begin to predominate in one place more than another. It is for this reason, and to save the trouble of dying, that the poor people in the Highlands propagate black, and ruſset, and brown, and other coloured ſheep, more than in any country where the wool is regularly brought to market. In the isle of Man a breed of dun ſheep is very common till this hour; and I have been told ſheep of the same dun colour, are common in the Crimea.

Of all the variety of colours I have seen among these flocks, that of the *silver grey*, consisting of a mixture of pure white and black filaments, is the most beautiful. Where the black is clear and ſhining, and

The learned zoologist, Mr Pennant, mentions having found at Athol house on his Scotch tour, *the jaw of a ſheep incrustated with gold coloured pyrites,* a mineral abounding in a valley close by, where he thinks were ſheep to graze, *their teeth* might acquire the same incrustation. Now Sir, I will venture to add, that if ſheep were to be *folded* in this pyritical valley, some of the gold coloured particles might, without a miracle, adhere to their fleece, and produce a curious yellow glittering appearance, which would not a little astoniſh the vulgar, and poſsibly transfer the story of the golden fleece from Colchis to Athol.

Dr Pallas on reading over the rough copy of this paper, made the following note at the bottom of this article.

A yellowiſh gloſsy tartar is found likewise on the teeth of the Kirguise ſheep, and I think in all

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the white pure, it has a very fine lustre and brilliancy. Mottled ſheep, consisting of spots of different colours are to be found in Shetland. At Aislabie park in Yorkshire there is a breed of the mottled ſheep which have been preserved there for a long while past as a curiosity. They are descended from a ewe and ram thus marked, that came originally from Andalusia in Spain. Their wool is very coarse.

J. A.

dry pasture grounds; but it is nothing like pyrites*.

I think with Pennant, Mr Editor, that the fourth variety mentioned by Boethius as inhabiting the island of Hirta, was very poſsibly the musimon or wild ſheep; for he describes it as larger than the biggest he-goat, with a tail hanging almost to the ground, and horns as thick and longer than those of an ox†.

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* This remark of the learned doctor perfectly coincides with my own observations on this head. The teeth of the greatest part of ſheep become black when aged; but many of them are yellowiſh, though that tinge is evidently nothing pyritical; and is often seen on the teeth of ſheep that feed where pyrites is rare, and vice versa.

J. A.

† In the time of Boethius, men were very inaccurate observers of natural objects, and much disposed to catch at the marvellous; on which account, their descriptions cannot be relied upon, as those of naturalists in our day, when they speak of what they have seen. I have never found a fact except this here mentioned, which indicated, that the long tailed ſheep were to be found, at an antient period, in Scotland. The native breeds of all the neglected parts of Scotland and the isles were certainly of the ſhort tailed sort. We can at this day almost trace every long tailed ſheep that is now found in Scotland, from the southward. That breed seems to have been first reared in England. It is in general of a larger size than the ſhort tailed sort. Poſsibly some coarse ſhaggy woolled breed, of the long tailed ſheep, may have been brought to that island among the plunder from England, in some of the military expeditions so common in antient times; and may have

## *Conclusion.*

IN the paper thus presented to the society for the melioration of Britiſh wool, through the medium of the Bee, I have endeavoured to concentrate the whole of Dr Pallas's observations on the flocks of the pastoral nations, (a few learned inquiries excepted, of which I have only given the result,) from the ample materials furniſhed by that liberal philosopher; and I think we may draw the following conclusions from the whole.

*1st.* That there is but *one species* of ſheep, divided into a certain number of varieties, distinguished principally by the *tail;* as the doctor has found that all the *different species* mentioned by *authors* propagate together and produce *prolific* descendants; which refutes all idea of a specific difference.

### *With regard to Wool.*

*2dly*, That the first variety of Pallas, the Tscherkeſsian or long tailed, are the best *wool bearing ſheep*, carrying naturally an woolly fleece without admixture of hair in all countries where it has been found; except always in the extremes of heat and cold, which turn wool to hair in every variety of the animal.

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propagated their kind there till the memory of their first introduction was lost. J. A.

*3dly*, That next to the Tscherkeſsian, the mixed breed he has named Boucharian, promiſes the greateſt advantages with regard to *fleece*, if managed with ſkill and attention by the able and induſtrious Europeans.

This variety, the 4th and laſt of our author, is diſtinguiſhed by a *tail*, thick and fat above, but long and lean below.

*4thly*, That the Ruſsian ſheep which conſtitutes his 2d. variety, diſtinguiſhed by a ſhort meagre *tail*, are a ſmall breed carrying wool of the very coarſeſt kind, only fit for the dreſs of the northern peaſants in a ſtate of vaſsalage; although climate, care, and paſture, ſeem to meliorate it very conſiderably.

*5thly*, that the large fat rumped, or fat tailed ſheep, the variety reared from the frontiers of Europe, to thoſe of China, by almoſt all the paſtoral nations, and the whole of the Nomades; and that which ſeems to be the moſt univerſally reared over the whole globe, as an article of food, from its ſize and fatneſs, ranks the loweſt with regard to *fleece*; as it carries only a ſpecies of coarſe wool mixed with hair, in all countries where it has been found: and even that very inferior fleece is ſo matted together, as to be with difficulty carded, if at all capable of that operation. However that laſt circumſtance obſerved by Dr Pallas in the Kirguiſe ſheep, may be owing to ſome local cauſe.

*6thly*, That a temperate climate is the most favourable for the production of wool; as extremes of both heat and cold have a tendency to convert it into *hair*, or at least into a species of wool so extremely coarse, as not to be easily diſtinguiſhed from it.[*]

*8thly*, That saline bitter pastures, have great influence in augmenting the size of ſheep, as well as in fattening them; at the same time that such pastures have a particular tendency to produce the species of *soft oily grease*, which forms more especially on the rump and tail of the steatopyga variety of ſheep, and is different from *suet*, the kind of fat common to ruminating animals.

*9thly*, That leguminous Alpine plants, especially the astragali [†], and a ſhrub resembling the robinia caragana, when aided by a temperate climate and exercise, have a tendency to produce the largest sized domestic ſheep the doctor saw in his travels, even equal to the musimon or wild ſheep, which lives and feeds like the flocks of the hills of Dauria, that resemble it so much in bulk : But that these plants have no tendency to form the *soft oily fat* mentioned above, which the doctor thinks is only produced by saline bitter pastures.*

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[*] Of the effect of climate on the wool of ſheep, more may be said than could properly come within the compaſs of a note. Perhaps this may afford a subject for a separate diſſertation. Some facts respecting this subject are ascertained with tolerable accuracy by experiment; others still are doubtful, and require further elucidation, so that I suspect we must here suspend our decision for a little. J. A.

[†] With regard to the nutritious plants mentioned above by my learned friend, I can say nothing of the ſhrub resembling a species of robinia, as he does not name it; but I believe you have none of the genus to which he compares it. However, surely the mountains of Scotland must be well stored with Alpine plants in general, to which

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he attributes so much merit; and as for the astragali, which he singles out, and that ſheep choose for food in a state of nature, whilst their instinct is not counteracted by acquired taste, you have three species of it, viz. *Astragalus glycyphillos*, or wild liquorice, *A. arenarius*, or purple mountain wilk wort, and *A. uralensis*, or silken astragalus.

*Arcticus.*

* The favourite food of the ſheep according to the accurate remarks of the great Swediſh botanist and his desciples, is the *festuca ovina*, or ſheeps fescue graſs, and on which they fatten very quickly. This plant is common in dry pastures in Scotland, and certainly could be still much more so by cultivation.

*Plants hurtful to Sheep.*

After mentioning plants which are eminently salutary to ſheep, it certainly will not be foreign to the subject to point out those that are poisonous from the same great authority. Many marſh plants are so. 1st, As the *anthericum oſsifragum*, or marſh asphodel. 2d, The *equisetum*, or horse tail. 3d, The *ranunculus flammula*, or leſser spear wort. 4th, The *myoſotis aquatica*, or water mouse ear ; and 5th, the *kalmia angustifolia*, and *latifolia*, the narrow and broad leaved

10*thly*, That much depends on the care and ſkill of the ſhepherd, to meliorate the *fleece*, augment the *size*, and correct the *form* of ſheep, *even to that of the horns*, by paſture, exerciſe, and above all by the judicious choice of rams, on which much depends; as not alone beauty and other deſirable qualities, but deformity and even diſeaſe may be propagated and handed down through many generations.

11*thly*, And laſtly, I think one might almoſt hazard an opinion from Dr Pallas's information, that by care and attention to the fleece of lambs, of the Tcherkeſsian, Boucharian, and Tauric varieties, from

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kalmia, two American plants, the moſt deadly of all ſheep poiſons.

Of theſe poiſonous plants, the firſt is very common in mooriſh grounds all over Scotland.

Of the 2d, you have 6 ſpecies of marſh plants; but which is meant by the Linnæan ſchool is difficult to gueſs; however there is little danger of ſheep meddling with what is hard enough to poliſh wood. The 3d. is common with you by the ſides of lakes and ditches; but a Highland man's bliſter, ſeems as little tempting to ſheep, as the joiner's poliſher.

The 4th, is common on the ſides of rivulets and lakes in Scotland. And as to the 5th, I hope it will never be brought over to Scotland, even for the botanic garden, if we are to credit Linnæus, that ſeveral foreign plants have planted themſelves over a whole province, the ſeeds being carried by the winds from ſuch gardens as they were introduced into for curioſity. *Arcticus.*

their birth to a certain age, a valuable fur trade might be carried on with the north and China, where they are in such high estimation with the rich and great, as a winter dreſs, even more than our finest Siberian furs, at least in Ruſsia and Poland.

Nay even common ſheep skins, however coarse, with the care and skill applied to every manufacture in Great Britain, would soon set at defiance all northern competition, and come to the widest market of any article of commerce; as every peasant has an outer winter garb, and most of the superior claſses as a morning gown, have at least one ſheep-skin ſhube, coarser or finer, in every northern country wherein the climate requires furs.

I must own however that I am speaking here, (I mean, with regard to the fabrication of ſheep skins with the wool on them in Great Britain,) with little or no knowledge of the subject; as the price of wool, hides &c. there, must determine the expediency of the measure: but if I am to judge of the ſucceſs of one Britiſh manufactory by that of another, with poſsibly 50 *per* cent against it, on the side of the Ruſsians, my speculation will not appear without some foundation. I allude to the curious article of iron purchased originally from this country, and afterwards sold here manufactured, after paying so many duties and charges on both sides the water *cheaper* than the natives can afford it: nay this is not confined to the finer articles; for even Britiſh iron railing, is sold in Petersburgh cheaper and neater than it can be made in this city from the original iron, although the Ruſsians have so great a sum in their favour, if all the charges are reckoned up, from the exportation of the rough, to the sale of the manufactured iron. Surely I say, judging from such an example of the wonderful effects of industry and ſkill, one would think, that ſheep skins, the *produce* of Great Britain, might at least come to this market with the advantage which superior skill and dreſsing would give them, over the native manufactories and that alone, in my opinion, were even the prices equal, would be sufficient to give them such a preference, as would send them through all the north; for the durability of a pelice or ſhube is a great object to the peasant, and indeed in a leſs degree to all claſses, whilst one half of the ſheep skins manufactured in the north, are partly rotten when brought to market, being burnt up, I believe, by a quantity of calcareous earth (probably in a caustic state,) with which every pore is filled. In ſhort, it appears to me that a much better mode of dreſsing, at least the common ſheep skin furs, might be fallen upon, than what is at present practised in Ruſsia; and that would give such a superiority to the new manufactory, as must be attended with a great sale; for I regard such an improvement, as a real desideratum in that branch of trade.

## *Explanation of the Plates.*

Plate first is an accurate view from a coloured drawing done by Dr Pallas's draughtsman under his eye, of the Siberian argali or wild ſheep.

Plate second, is a side, and back view; letters A *a* of the ram of the *steatopyga* or fat rumped variety in its greatest purity of breed, as obtaining among the Kirguise Tartars in the vast plains of Southern Tartary; the position of the animal marked with *a* ſhows the *uropygium* or fat rump.

Letter *b* is a representation of the head of the same animal, with a couple of *noneola* hanging from the neck, called by the Ruſsians ear-rings.

Letter C is a drawing of another Kirguise ram with five horns, ſhowing at same time the hanging position of the *ears* of this variety.

Plate third, is a drawing of a degenerate breed of the *steatopyga* variety of ſheep, reared on the banks of the Jenisey and Volga, without horns, and with the *uropygium* or fat rump greatly diminiſhed, and one *noneola*.

Letter *b* is a drawing of a ram of the same variety of ſheep, from the flocks of the Jenisey Kirguise, with four horns symmetrically arranged by nature as is frequently the case with this breed.

Plate fourth, *fig.* 1, and 2. gives two different views of the horns of the *ægagrus* or wild goat, found by Pallas on the mountains of Caucasus and Tauri.

*Fig.* 3. represents one of the horns of the Siberian ibex, an animal resembling the goat on a superficial view, but differing widely on nearer inspection.

Fig 2.

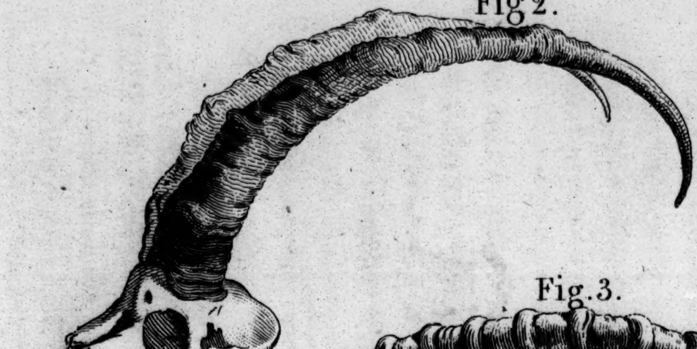

Fig. 1.

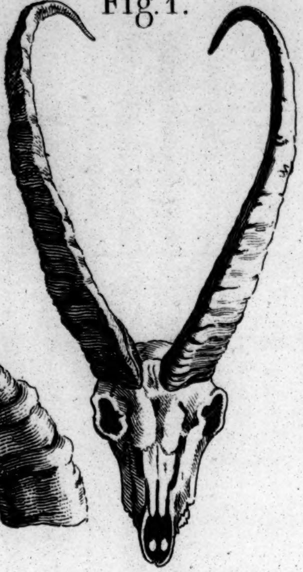

Fig. 3.

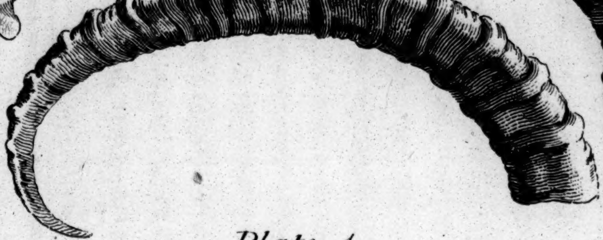

*Plate 4.*

BRITISH MUSEUM

# APPENDIX FIRST.

## THOUGHTS ON WHAT IS CALLED *VARIETIES*, OR DIFFERENT BREEDS OF DOMESTIC ANIMALS, SUGGESTED BY READING DR PALLAS'S ACCOUNT OF RUSSIAN SHEEP.

The only rule that has hitherto been adopted by naturalists to mark the distinction between a *species* and a *variety* is, that though different species of animals of the same genus may be brought to breed together, as the horse and the aſs, yet the animals thus produced, are not prolific; whereas the progeny arising from an intermixture of different *varieties* of the same *species*, are themselves equally prolific as the parents from which they sprang. Adhering to this rule Dr Pallas, very properly, calls all the kinds of sheep yet known, only *varieties* of the same *species* of animal, because he has found that the mixed progeny of the whole are prolific.

Naturalists however have not stopped here. In their desire for simplification they have gone a step farther, and are now in general disposed to maintain that all the *varieties*, properly so called, have been produced by accidental deviations only from *one* parent animal, which they believe has originally constituted the whole of each indivual *ſpecies;* they of course endeavour, in most cases, to condescend upon some one of these *varieties* as having been the original from which all the others have ſprung. In both these laſt aſsumptions however, they seem to go farther than facts hitherto well authenticated can authoriſe them. They reason here at best only from *probabilities* ; from which no inferences can be admitted as *certain*: and as there are probabilities, perhaps equally strong against the opinion they have adopted, as for it, the safest course in this case would seem to be, at leaſt, to ſuspend our opinion for the present, and to decline drawing any certain conclusion, till the facts neceſsary for giving authenticity to any opinion shall have been fully ascertained.

*Buffon*, who is the least scrupulous of all modern naturalists, has been the most forward to decide in this, as in many other cases. He does not so much as condeſcend to admit that there can be a doubt in this case ; but on all occasions aſsumes it as a certainty, that all the *varieties* of one *species* have been derived from *one* parent ; and boldly raises upon th
supposition many practical inferences, which if his

theory ſhould prove to be unfounded, might lead to very important errors ; so that it is not a matter of idle curiosity to investigate this question.

Among the *varieties* of the same *species* of animals, we find very great and striking diversities in respect of size, qualities, appearence, natural instincts, and faculties. Between the largest sized mastiff dog for example, and the smallest lap dog, when both are well fed, and at full growth, the difference is not, I should suppose, leſs than as ten to one of absolute weight. The *hound*, properly so called, poſseſses the sense of smelling in the highest perfection, so that he pursues his game invariably by the scent. The gaze hound on the other hand, is perfectly destitute of that sense in regard to the discrimination of game,* and pursues it invariably by the eye only ; whence his name. The pointer and the spaniel though both poſseſsing the sense of smelling in great perfection, as well as the hound, are endowed with instincts very different ; and exercise the sense of smell each in a way peculiar to its kind. The pointer and the ſhepherd's dog can be each taught their leſson in their own stile with equal facility; but the one can never be brought farther than to act by a sort of mechanical impulse, steadily to one point, while the other can be taught to act in some measure like a reasoning animal, who is authorised to vary his conduct as circumstances require; and does so accordingly in some cases with a cautious discretion, that exceeds even some of the human race*. Some varieties of dogs take to the water easily, while others avoid it with much care: Some only howl like the hound, others bark almost inceſsantly, as the lap dog; others like the grehound seldom let their voice be heard; and others, are entirely mute. To enumerate all the diversities would be tiresome; but this slight ſketch ought to be sufficient to make one hesitate in admitting, without proof, that such prodigious diversities ſhould all have been the progeny of one common parent.

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* Here a distinction takes place, somewhat analogous to what is observed to take place among men, with respect to the discrimination of musical sounds. A man may have the sense of hearing sufficiently acute, yet be totally destitute of *an ear for music.* The grehound too poſseſes, I believe, the sense of smelling in some cases sufficiently strong yet is not able by that means to trace his game.

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* Of the sagacity of dogs many instances might be adduced; but none that I have ever met with can equal the following instances of the sagacity of a ſhepherd's dog; the owner himself having been hanged some years ago for sheep stealing, the following facts, among others respecting the dog, were authenticated by evidence on his trial.

When the man intended to steal any sheep, he did not do it himself, but detached his dog to perform the busineſs. With this view, under pretext of looking at the ſheep, with an intention to purchase them, he went through the flock with his dog at his foot, to whom he secretly gave a signal so as to let him know the individuals he wanted, to the number of perhaps ten or twelve, out of a flock of some hundreds; he then went away, and from a distance of several miles sent back the dog by himself in the night time, who picked out the individual sheep that had been pointed out to him,—separated them from the flock, and drove them before him by himself, for the distance of ten or twelve miles till he came up with his master, to whom he delivered up his charge.

Were these diversities only casual and apt to vary, it might be more easy for us to give faith to the hypotheses; but this is not the case. Experience hath fully proved, that any one breed may be kept perfectly uncontaminated for any length of time, with all its distinctive peculiarities entire, merely by preventing an intermixture by copulation. Nor is this all: it is also known that if such intermixture be permitted, the descendants will undoubtedly be a mixed breed, evidently participating of the qualities and appearances of both its parents. Between a hound and a grehound, a mongrel breed is obtained which poſseſses the sense of smelling, though in a leſs degree than the one, and the faculty of fleetneſs in a leſs degree than the other of its parents; and its whole external appearance evidently indicates at first sight, the compound of the stock from whence it has descended. The same thing is observable in every other mongrel breed: and after the distinctive qualities have been thus blended together, it does not seem poſsible ever to separate them, so as to obtain once more a breed from that progeny, which ſhall poſseſs the original qualities of either of the parents *pure.* This may be indeed *nearly* effected, by croſsing repeatedly with a pure individual of the unmixed breed, through many generations ; by which means the qualities which were once *equally* blended, will become so unequally mixed, as that one of them ſhall not be discernible ; just as an equal mixture of milk and water might, by frequent additions of pure water, have the milk so much diluted as to be totally imperceptible.

Now, in this last case, whether is it more natural for me to suppose, when I see the two fluids, milk and water, perfectly distinct, that these fluids were originally separate and distinct things ; or to believe that both the milk and the water had been the same thing originally, and by some wonderful proceſs, of which we had seen no example, but much the reverse, had spontaneously separated, and in time become two distinct fluids, both of which we are sure, inevitably to lose, if ever they ſhall be suffered to mix together again? The production of distinct breeds of animals, is equally contradictory to the whole of the experience we have had in the breeding of domestic animals. It is easy for us when we please to adulterate any breed ; but it totally exceeds onr power after such adulteration to recover the pure breed again.

If, with a view to enlarge our ideas on this head, we go to vegetables ; in regard to the varieties of which, philosophers entertain nearly the same opinions, we ſhall find among those that are called *varieties* very great diverſities, so as to constitute several distinct claſses.

In one claſs, for example, among which may be ranked the common potatoe, we find that plants obtained from seeds are disposed to sport infinitely ; and none of the progeny can ever be expected to be found *exactly* of the same kind with the parent stock ; so that if that stock be not propagated otherwise than by seeds, it will be lost never to be recovered.* Many plants belong to this claſs, as pinks, carnations, &c.

Another claſs of plants, which are equally stiled *varieties*, are not liable to sport, or indeed to intermingle at all in breeding, but continue to propagate their own kind by seeds without variation. No man I believe ever had a white pea from a gray, or a gray from a white. If white pease perfectly unmixed with gray are sown, it is well known the whole of the produce will be white, and so of gray. Many plants also belong to this claſs.

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* See Bath society papers, vol. vi.

A third claſs, like that of animals, may be raised by seeds either pure and unadulterated, or mixed and of a mongrel breed, at pleasure. Cabbages afford a noted instance of this sort. White or red cabbages may be reared from seeds without degenerating, for any length of time, if the two kinds be kept at a great distance from each other ; but ſhould a white cabbage be allowed to perfect its seeds in the neighbourhood of red cabbages producing seeds at the same time, a mongrel kind would rise from these seeds, which would not be pure white, nor distinct red, but a pale red compounded of the two. Early and late cabbages ; which are very distinguiſhable from each other in several respects, besides earlineſs, are adulterated in the same manner. Savoys in like manner may be blended thus also with cabbages or other greens. In ſhort, the peculiarities affecting this claſs of plants, are precisely similar to those affecting different breeds of dogs, and other animals ; so that when once a mongrel breed has been obtained, there is no recovering the true sort, but by a freſh importation of uncontaminated seeds, though the mongrel sort may be preserved as long as you please by propagating it by itself.

The inference I would draw from these facts, (and other claſses of plants might be named) is, that since we find naturalists have overlooked some very obvious peculiarities of *plants*, which affect those diversities that have been called *varieties*, they may have in like manner overlooked other peculiarities that may occasion striking diversities among *animals*, which have been called *varieties:* and as this subject has never yet been thoroughly investigated, it behooves us to be cautious in admitting general conclusions.

With regard to dogs, which as being well known to every one, are a fit object for illustration, we see, that let a small lap dog, and a large mastiff be fed with the same food, and tended with the same care, the one discovers no symptoms of increasing in size or diminiſhing it more than the other. Let them be carried from one country to another, they equally preserve their original distinctive qualities, without any farther change than the climate may perhaps produce; which equally seems to affect all the varieties of this animal: never was there adopted an hypothesis more truly absurd than that of Buffon in this respect: nor was there ever made such a barefaced attempt to ry how far the credulity of mankind could lead them astray in deference to a great name, in direct contradiction to facts which fall immediately under the cognisance of every man who pleases but to open his eyes, and look right before him, as in those bold and unfounded aſsertions which he has been pleased to make, with regard to the transformation of dogs, from one variety into another. Yet these opinions have been inadvertently transcribed many times by learned naturalists, without one symptom of doubt or hesitation.

The ſhepherd's dog Mr Buffon considers as the parent stock from which all the different varieties have been produced, by a change of climate, education, food, and other circumstances. " This animal (he " observes) still continues pretty nearly in its ori- " ginal state among the poor in temperate climates. " Being transported into colder regions, he becomes " smaller, as among the Laplanders ; but becomes " more perfect in Iceland, Ruſsia, and Siberia, " where the climate is leſs rigorous, and the people " more civilized."——But if there is a difference in the dogs of these countries, it can scarcely be owing to the cause aſsigned, as the climate of Lapland is as mild as that of a great part of Siberia, and the inhabitants perhaps more civilized.

" The ſhepherd's dog, (he farther observes), if " transported to temperate climates, and among peo- " ple entirely civilized, such as England, France, " or Germany, becomes divested of his savage air, " his pricked ears, his long thick hair, and from the " influence of climate and education will become a "bull-dog, a mastiff, a beagle, or a hound."—— But if this were the case, whence ſhould it happen that we in Britain have the race of ſhepherd's dogs in as great perfection as any where else, and the mastiff, bull-dog, hound, &c. in equal perfection; and can preserve the breeds of each of these kinds as distinct from one another, as if they had been bred in the most distant corners of the earth?

"The hound, the terrier, and small spotted setting-dog, he considers as of the same family; and "aſserts, that they are often all produced at the "same litter, although the bitch ſhould have been "covered with only one kind of dog."——I ask the reader, if ever he knew a single instance where this happened?

"The hound, (he farther observes), if transported into Spain or Barbary, where the hair of all "animals becomes soft and long, will be converted "into the land and water spaniel;—and when these "are again brought back to Britain," instead of returning to their former state of a hound, "they become the small ſhagged dog."——But who does not know, that spaniels continue to be bred in Britain for ages, without degenerating in the smallest degree?

We have seen above, that the mastiff, bull-dog, beagle, and hound, to which may be added the terrier and small setting-dog, are all produced in Britain from the ſhepherd's dog transported from cold climates.——" But this mastiff dog, (he observes), " when carried to the north," deserts his original family, and " becomes the large Daniſh dog;—and " when transported to the south, becomes a gre- " hound. The same transported into Ireland, the " Ukrain, Tartary, Epirus, and Albania, becomes " the great wolf-dog, known by the name of the " *Iriſh dog*, which is the largest of all dogs." Thus he makes the ſhepherd's dog, when transported from the north to Britain, become a mastiff; and that again, when remanded back to the north, instead of returning to its original state of a ſhepherd's dog, becomes a large Daniſh dog;—which again brought back to Britain, its original country, instead of a mastiff, becomes a grehound; which by another change of climate, scarce perceptible, is metamorphosed into the large Iriſh dog.—These surprising transformations might figure very well in Ovid, but do not tally quite so well with the character of a philosophic natural historian.

" The bull-dog, (he farther goes on), when trans- " ported into Denmark, becomes the little Daniſh " dog; and this little Daniſh dog, sent into warm " climates, becomes the Turkiſh dog without hair." ——In the last paragraph, we saw the mastiff in a northern climate *encreaſe* in size, and become the large Daniſh dog:—here his brother the bull dog, by a like change of place, *dwindles* into the small Daniſh dog.—How it ſhould happen, that the same change of climate ſhould produce changes so diametrically opposite, remains to be explained.——When this little Daniſh dog, however is sent back to milder climates again, he does not recover his former size, or grow larger, like the mastiff; but by another metamorphosis, altogether as extraordinary, becomes the naked Turkiſh dog.——The hound, the full brother of this mastiff, we saw on a former occasion, when carried to the warm coast of Barbary, got a coat of longer hair, and became a spaniel; this one loses his hair entirely.

Can any thing be more contrary to reason, experience, and facts that every man has before his eyes every day in his life, than the above hypothesis!

It is humiliating for the pride of man, who plumes himself on the superiority of reason to remark this.—And it is mortifying for modern philosophy which affects to be founded on experience and accurate observation of facts alone, to point out such things: but truth ought in all cases to be adhered to.

On the other hand. Is there any thing inconsistent with that wisdom and beneficence so universally conspicuous in the system of this universe, or any thing that contradicts the general experience of mankind, and the facts that fall under his observation, in adopting the hypothesis, that a diversity of animals may have been originally formed with discriminative faculties and propensities fitted for the various purposes required of them in the general system, and separated from each other, though not by unsurmountable barriers, yet by such peculiar propensities as might serve to preserve the kinds sufficiently distinct to answer all the purposes required of them? The different breeds of dogs, for example, though not prevented by any physical barrier from intermingling, are yet so distinctly separated from each other by certain peculiarities, as naturally to induce one claſs to aſsociate together, in a state of freedom, in preference to others. The hound, for example, would naturally aſsociate with other hounds who pursued the game, at a slow pace, by the sense of smelling, in preference to any other claſs of dogs. Should a grehound encroach upon this pack, he would so often destroy the game, and eat it before their approach, that they would find it neceſsary for their own preservation to drive him away, or tear him in pieces. Grehounds would as naturally aſsociate with other grehounds for the same reason of mutual convenience ; and so of other varieties. Thus would a distinction be formed, which in a state of nature would tend to preserve the several breeds uncontaminated. This purpose would be still strengthened by the acquaintance formed by the young of each tribe, with the mother and others of the same kind, with whom they were accustomed to aſsociate from their infancy, and with whom we know they preserve habits of intimacy and kindneſs through life. These few particulars, without taking notice of many others, (as the size, which alone would effectually prevent many of the breeds from ever intermingling,) are sufficient to ſhow, that in a state of nature, the different varieties of the same species of animals might be preserved distinct perhaps for ever. In ſhort we do actually know of two instances where the breeds of two pure *varieties* of animals have been preserved in a wild state, since the creation of the world till the present hour, distinct from all others of the same kind, and uncontamina tedmerely by the peculiar instincts with which they are naturally endowed. These are the *wolf* and the *fox*, which though ranked by Buffon, and most other naturalists, as distinct *species*, are now proved, by the most decisive experiments, conducted under the eye of the ingenious Mr John Hunter of London, to be only *varieties* of the dog kind, which may be brought to intercopulate with others of the same species, and by that means produce a mongrel breed, participating as usual of the qualities of both parents, and equally prolific as others of the same kind.*

In regard to ſheep, the varieties of this useful claſs of animals seem to be considerable, and their natural propensities so discriminated as to be admirably calculated for adapting them to different situations on this globe, so as to make them a very universal inhabitant of it: and these are so diversified as to habits and instincts, as to preserve the principal breeds very distinct, if left in a state of nature. The argali, strong, active, nimble, delights to live among rocks and inacceſsible places; while the large sluggiſh breed of ſheep, such as those that have been taken into keeping by our countryman, Bakewell, could never ascend these steeps, but are well calculated to consume the produce of the fertile plains; there is therefore no chance that these two breeds would ever intermingle, if left entirely to themselves. The *last* of these two varieties has indeed been long domesticated by man, as being utterly incapable of withdrawing itself from his sway, though the *first* has been able to preserve its independence till the present hour in some of the mountainous and least inhabited districts on the globe.

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* Vide Philosophical Transactions, Anno, 1792, and miscellaneous eſsays by Mr John Hunter, 4to 1793. London. The same able naturalist has obtained a prolific breed between the common cow and buffalo; which affords another proof of the fact specified in the text. This will be more particularly mentioned in a future paper.

These two are perhaps the most opposite extremes of the varieties of ſheep; others are separated by leſser distinctions. The small nimble light bodied ſheep like those of Shetland, being capable of undergoing much travel, are fitted for open hilly pastures, where a wide range is neceſsary before they can pick up a scanty subsistence; these are therefore to be found chiefly in barren regions, thinly inhabited by man, where of course they enjoy a freedom approaching towards the state of wildneſs; while the weightier fat rumped ſheep of Asia, require a richer pasture, and plants of more luxuriant growth. Thus the different breeds would naturally separate from each other; and being once separated, that desire which all gregarious animals, at least, have to aſsociate with those of their acquaintance in preference to all others, would keep them so distinct as never to be in danger of losing the breed, while left to themselves.

It is unneceſsary here to pursue this disquisition through a more minute investigation of particulars. But it is of importance to take particular notice of a very ingenious remark of Dr Pallas, as it tends to ſhow the immense power conferred upon man by the creator for the melioration of the objects put within his reach, and adapting them for the particular purposes he may have in view for his own emolument; if he chooses, by a patient steadineſs of conduct, to properly avail himself of those faculties that heaven has conferred upon him; and accounts for some particular diversities of animals not before enumerated.

Dr Pallas in the foregoing eſsay has brought together many facts which tend to ſhow, that although any one *variety* of domestic animals, if kept free from intermixing with any other variety of the same species, will in general, propagate the same kind with little material change, yet that if from unknown or accidental causes, an individual ſhall be produced poſseſsing some unusual peculiarities, that individual has a tendency to produce others resembling itself in a certain degree, even in its individual peculiarities; so that if a male and female ſhould at the same time be met with, which both poſseſsed the same kind of individual peculiarity, these, if made to breed together, will produce a distinct breed, which will, by hereditary deſcent, render in some degree permanent, that peculiarity which was at firſt accidental; and this effect will be rendered the more certain, if care be taken at all times to separate from the breeding stock thoſe individuals which chance to poſseſs the diſtinguiſhable peculiarity in a leſs eminent degree than the others.

Now, although every breed of animals preſerves in general its diſtinguiſhing peculiarities with little variation, yet theſe accidental deviations when conjoined with the peculiarity of their becoming in ſome meaſure hereditary by a careful ſelection, put it in the power of an attentive obſerver, to make prodigious improvements upon the domeſtic animals that are under his immediate care, and thus give room to permanent changes that never could have been experienced if the animals had continued in a ſtate of nature.

Let us ſuppoſe, for example, that the breed of ſheep of which a man at firſt obtained poſseſsion, contained in general ſome hairs among the wool, and that he found theſe hairs were not fitted for the particular uſes he meant to make of that wool. He would ſoon obſerve that the fleece of ſome tranſient individuals in the flock containad leſs of that hair than the others. Theſe individuals he ſelects to breed from. The wool of all their deſcendants of courſe contains much leſs hair in it, than the general maſs of the original ſheep. Here then is one melioration in conſequence of attention, that never could have taken place in a wild ſtate, becauſe the peculiarity of the individual ſheep would have been soon blended with the general maſs, and loſt in conſequence of a promiſcuous intercopulation.

A purer wool being thus obtained; by the ſame kind of attention continued, though another tranſient individual might in time appear, perhaps with a more hairy fleece than the improved parent ſtock, it would of courſe be baniſhed from the breed; and when another individual, with ſtill purer wool might be produced, this one being again ſelected to breed from, occaſions an additional refinement. In this way it might happen that in courſe of time, by a continued care, a ſheep might at laſt be found, among the wool of which there were no hairs at all; and this alſo being ſelected would afford a breed with wool entirely free from hair, unleſs upon an accidental individual, which would of courſe be ſeparated from the breeding ſtock whenever it appeared*.

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* A ſingular inſtance of the powerful tendency that animals in a ſtate of nature have to preſerve the ſeparate varieties diſtinct, occurs in regard to the Shetland breed of ſheep, ſo juſtly celebrated for the unequalled ſoftneſs of its pile, and brilliancy of its colour. In

By a similar proceſs, the *colour*, the *fineneſs*, the *length*, the *ſoftneſs*, the *criſpineſs*, the *lankneſs*, or any other peculiarity of wool might be greatly im-

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the Shetland isles, though the ſheep are not entirely in a wild state, they are so nearly so, as scarcely to deserve the name of a domestic animal, and suffer no other effect from the care of the owner than those which tend to deteriorate the breed; yet in spite of these efforts to debase it, continued for ages, there are still remains of that breed tolerably pure in that place. The measures that have been taken to debase it are as under:

1. Foreign breeds, producing hard coarse wool, have been often introduced into these isles. But the nimble active native ſheep, frequenting in general the more desolate wilds at the greatest distance from the dwellings of the natives, in some measure withdraw themselves from the others, like the Tartar Nomades from the Ruſsian peasants, and thus get the breed only partially debased by accidental stragglers.

2. As the natives scarcely look at their ſheep save once a year, and do not ſheer the wool, but gather it upon the heath as it falls from the animal in handfuls, they have had no opportunity of remarking the great improvements that may be made by a selection of the best sort for breeders; and therefore have never attempted to make such a selection.

3. In consequence of their ignorance of this peculiarity they have bestowed no care in the choice of their rams, so that no other rule has been adopted in the choice of rams but a kind of neceſsity. At the time of castrating the ram lambs it often happens that one or both the testicles have not then descended into the scrotum, so that the gelding of such being more difficult and dangerous than the others, to save that trouble and avoid that danger, all these *ridgelings*, as they are called, are left to be rams, without regard to the quality of their wool or other properties.

proved, and considerable alterations be made in the ſhape, appearance, and other peculiarities of the ſheep, without the smallest alteration of the parent breed, or intermixture with others. In this way leſser variations may be produced, which may constitute a kind of *artificial* varieties of ſheep. And it is probable, that this circumstance being observed has given rise to Buffon's notion, that *all* the varieties we perceive in the same species must have been obtained

4. But they do not stop here. Though the natives are ignorant of the powerful tendency with which animals are naturally endowed to perpetuate the peculiarities of the parents by breeding, they know well that if the same individual once carries a fleece of fine wool, it will continue to do so all its life; and as the finest of that wool is much prised,—when any person finds a lamb having a very fine fleece, he is anxious to preserve the property of it to himself as long as poſsible: but as the ſheep are allowed to roam very much at large, they have observed that the *rams* are in much greater danger of straying from the parent flock at the rutting season than the castrated ſheep; and as these stragglers are often not recovered to the owner, he thus loses the fine fleece which he values so much. To guard against this dreaded evil, he is at great pains to see that all the ram lambs that have fine fleeces be carefully gelded. Thus does he verify in good earnest the old fable of Esop, and actually kills the goose for the sake of its golden egg. There is not perhaps upon record such a striking instance to be found of the powerful tendency of nature to preserve a breed, in spite of the efforts of art to destroy it, as this very case affords. The conduct of these persons however appears to be so very extraordinary, that while I thus state it with impartiality, I am forced to appeal to thousands of people now living for the truth of it, lest it might be supposed to be a mere fabrication of my own.

in time from one individual. But it deserves here to be well remarked, that variations of this sort, never could have taken place *in a state of nature*, so as to produce any thing like a general change. In regard to this particular we may truly say, that "all is the gift of industry;" for without the fostering hand of man, the bleſsing which heaven intended for him would have been lost. The distinguiſhed particular would have been suffered to die with the individual, as its peculiarities would immediately have been blended promiscuously in the general maſs.*

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* Should it ever happen, that the beaver ſhall come under the power of man, it is not impoſsible, but the fur of that animal might, by attention and selection, be greatly meliorated. In its present state there are many long and stiff hairs, interspersed through the fine soft fur of that animal, which must be separated from that fur, before it can be applied to any use. This is a very troublesome operation, and the best method that has hitherto been adopted for effecting this, is to allow the Indians to wear these furs as garments, until the stiff hairs, which loosen before the fine fur, gradually disappear; by this proceſs the fine fur is much worn also.——But were men enabled to select such beavers for breeding apart, as chanced to have leſs of this hair in their fleece than usual, it would gradually become thinner, and by the same care continued, might in time perhaps entirely disappear. But the beaver seems to be too ſhy an animal to afford any probability that it ever can be domesticated, and therefore we are not to look for any improved varieties of this, more than of other wild animals.

The same mode might be taken to improve the wool of the vicuna, a small species of the camel tribe, which affords the fine wool called *laine de vigogne*, or vigonia wool, which also abound

These observations may tend to explain in some measure the cause of a fact, that has been often noted

with coarse hairs like that of the beaver; and as this animal can easily be domesticated, and is known to live in the cold climate of Aranjuez in Spain, could its fleece be once purified from the hairs that now debase it, that creature might in time become a valuable addition to the stock of domestic animals in Europe.

This mode of improvement may be applied to *vegetables*, as well as to animals, with great benefit to the public, and advantage to individuals. Having observed that the different plants of the same kinds of kidney beans vary from each other exceedingly, in regard to their prolificacy, I was very desirous of saving some seeds this season from some of the most and of the least prolific plants in the same bed, to sow them apart, and observe the result; but unfortunately, they were gathered without my knowledge, so as to mar the experiment for a year. Having mentioned this circumstance, with regret, to a very attentive gardener, he aſsured me that the same circumstance had struck him long ago, and that he had tried the experiment, and said it never failed that the seeds produced from the most prolific plants always afforded by much the most abundant crop, though there was even among these a considerable diversity in particular plants; but by a constant selection in this way, he thinks perhaps the produce might be prodigiously augmented.

I had occasion to take notice, Bee vol. vi. p. 96. that another attentive gentleman, had, by the same mode of selection, obtained a variety of pease much more early than the common; and no doubt by an equal degree of care, other valuable peculiarities might be increased.

Another gentleman of my acquaintance having about a dozen years ago thus selected some ears of wheat of a peculiarly fine quality, has obtained a variety, which by a continuance of the same care, now yields but never, that I know of, accounted for; viz. that animals in a wild state, preserve in general, a great uniformity of colour, and are little diversified in appearance, whereas among domesticated animals, a much greater variety is observable in the colour and appearance of the individuals of the same kind.

This phenomenon I think may be thus explained: when an individual of an uncommon colour or appearance chances to be produced, especially for the first time, among a race of domestic animals, which before that period were generally uniform, it would be looked upon as a great curiosity; it would of course be valued—preserved with care—and its descendants, if bearing marks of the same sort, also preserved. A male and female of this kind being once obtained, this diversified breed would be perpetuated; and these afterwards intermingling with others, would destroy the uniformity of appearance of the wild breed. Another diversity of colour or appearance, being in the same way selected, this also would occasion freſh room for new diversities. By a similar mode of selection, continued for ages, some

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him a crop which he is confident, in equal circumstances, will be in general worth two guineas per acre more than if he had taken his seed at random. This opens up a wide field for the attentive and industrious improver!

persons fancying one variety, and some another, it must at last happen that the diversities will become so numerous, as that the original breed can scarcely be distinguiſhed from the others.

Now, although similar accidental diversities of an individual, sometimes occur in a state of nature, these, for the reasons above aſsigned, are quickly lost; and the general breed continues unvaried. That such diversities sometimes do occur among wild animals, is well known by every collector of natural curiosities. I have myself seen a blackbird, T. *merula*, of a milk white colour, that was ſhot in a wild state. I once saw a rook mottled black and white, exactly like a magpie, among a great flock of others. I have seen a tame white mouse; and a whole nest of young mice were once brought to me, consisting of ten or twelve, which were either white or mottled, and I think few or none of them were entirely of the ordinary mouse colour. This I presume had been the progeny of a mouse probably pure white, with a mate of the usual colour. If among this nestling, there were a male and a female pure white, there is little room to doubt but a breed of white mice, might have been procreated, if these had been ſhut up together. I was at that time so much hurt by the ravages of mice, that I was glad to get them all destroyed, so that no experiment was made of it ; I have since regretted it was not done; and this ſhows exactly what may be expected to be done among domestic animals, and what does actually happen among wild animals, in cases of this kind. Probably no marks of the white black bird, or of the pied rook, were preserved among their progeny, or they would be soon absorbed in the general maſs.

Another circumstance that may occasion a diversity among domestic animals, which has not been much attended to, though individuals must have, on many occasions, remarked it, is, that though the family likeneſs, if you please, or the distinguiſhing peculiarity of the breed, will sometimes be totally wanting in *one* individual of the breed, yet there is a tendency to revert to it ; and it will often happen that the progeny of that accidental* variety, will resemble the parent stock more than the immediate parent itself. A man, for example, who, from a casual individual deviation, bears no resemblance to his father, may have a child that is the exact picture of its grandfather. In like manner a horse, which has been casually black, though descended from a breed, the general colour of which is white or grey, may produce a grey or white foal, even from a black mare. Instances of this kind sometimes occur; but these are matters not worth pursuing farther at present.

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* We call *accidental* such circumstances as we cannot account fo in matters of this sort.

The diversities that man may thus artificially produce in the animal creation, may be not unaptly compared to many of those produced among vegetables, by attentive observation and careful selection, nearly of the same kind. It often happens, that the leaves of a tree or plant, from the operation of some cause that eludes our search, become either wholly or in part blotched, or stained with stripes of white or yellow or red, in various ways. If plants having these peculiarities are multiplied, either by parting the roots, by cuttings, by buds, or by layers, as the nature of the plant admits, the peculiarities are often preserved, without variation, for any length of time; and thus a new variety is produced, which never would have propagated its kind so as to perpetuate it, but for the attention and care of the cultivator*. In

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* It frequently happens among plants, that a single branch or twig only is thus blotched in the parent stock, while all the rest of the plant retains its original colour; and it is well known that if the coloured branch, and that of the natural hue, be both separately propagated, they each for the most part retain the colour and qualities of the parent branch from which they were taken.

The diversities in this respect are various. I have just now in my poſseſsion, a plant of the *scarlet* Lychnis vulgo, LICHNIS *Chalcedonica*, this manner are our nurseries and gardens filled with striped and blotched leaved plants, as our court yards are with poultry of various colours, which never are preserved, while they are in a wild state. Thus does man produce varieties both in the animal and vegetable kingdoms, that are different from those diversities that nature had originally formed; but these are of a leſser kind, and though differing in certain respects from the parent stock from which they sprang, they still retain the general habitudes and appearance of the parents, and may easily be recognised as their descendants.

In another manner man has it in his power to diversify the breeds of animals, (and of some vegetables) to suit the purpose he has in view. All the varieties of any one species of animal are seldom to be found naturally in one place. One kind prevails in one region of the world, and another kind in another district; and so of a third or fourth, or any indefinite number. Each of these poſseſs certain peculiar characteristic qualities, which may render

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obtained from seeds, a variety of a white colour. This if propagated by slips, preserves its variety; but at the present time it is in flower, and having several stems, *one* of these has ſhowed itself of a red colour, though it is only a branch from a larger stem, all the other flowers of which are white.

one breed much more proper for one purpose than another is*. To select from all this diversity, that particular breed which poſseſses in the most eminent degree the qualities he wants, opens up to the attentive *econome* a wide range for observation and experiment.

But if all this were done, his progreſs does not stop here. He may find, after he has examined them all, that certain peculiarities which might be useful to him, are not to be found in the highest degree poſsible in any one of these. He may observe that if the carcase of one were mended in certain respects, by being blended with that of another, it would be better than either; and so of fleece, hardineſs &c. &c: so that by croſsing one breed with another, a mongrel kind might be produced, that would be more beneficial to him than that of either of the parents.

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* I here speak as a *practical* improver, without hesitation or doubt; for in whatever way the philosophical question about the *varieties* of domestic animals may be finally solved, there can be no doubt, but that the practical farmer may safely trust to each breed propagating its kind in preference to that of another. Let the philosopher argue as long as he pleases to convince him that all the varieties of horses are the same, and that therefore it is of no consequence to him what kind he breeds from, seeing culture, food, and care, have produced all the diversities; the plain farmer knows, that the man who was to expect to have a horse that would excel in the race, by breeding from a heavy Flanders mare and stallion, would be little better than a bedla-

Thus may he mix and compound them as it were at pleasure; and in this way he may produce another diversity of breeds, that nature never would have produced without his intervention.

Thus does it appear that animals, if left to breed by themselves in a wild state, would naturally preserve the varieties distinct and separate from each other, so as seldom if ever to produce any new varieties, and that of course if there had been originally but one only of each species, the probability is that that one kind would never have deviated into a great diversity of kinds. And though after they come under the power of man, he may produce certain leſser variations, that may be deemed a kind of varieties; yet as these his artificial productions, are never any thing else than either small modifications of a particular breed, which still retains its general qualities distinct, or an evident compound of two kinds already known, we may in general conclude: that as certain breeds of sheep, we will say, which are placed at a great distance from each other, and distinguiſhable

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mite. Here therefore I wiſh to put philosophical subtleties, which may have a tendency on some occasions to confound the understanding, entirely out of the question, and refer to plain matters of fact. About *poſsibilities*, our limited knowledge forbids us to pronounce; here a *probability*, which may be as ten thousand to one, is, for every practical purpose, to be considered as a *certainty*.

by very striking peculiarities, are to be found in situations where the hand of man can scarcely be supposed ever to have had a preceptible ſhare in altering them by culture, there have been originally a considerable number of varieties of this useful species of animal, which were endowed with different qualities, instincts, powers, and propensities; and that it behoves us now to ascertain, by careful observation, and accurate experiment, the distinguiſhable peculiarities of each variety, if ever we hope to draw the utmost poſsible benefit from the rearing of it.

The practical inferences from the whole of this investigation then are: That there are to be found dispersed over this globe, many *varieties* of every species of useful domestic animal: that the particular distinguiſhing peculiarities of each cannot be known, until they ſhall have all been examined by persons of ſkill; and accurate comparative trials made, to ascertain all these peculiarities: we can never therefore say that we have reached nearly the ultimate perfection that this department in economics is naturally susceptible of, till this ſhall first have been done.

If this were once done, it would not be a matter of very great difficulty, to judge with a probable degree of certainty, of the means of producing a mongrel breed that ſhould tend to augment the peculiar qualities that were wanted at the time*.

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* It has been often aſserted with great poſitiveneſs, and is very generally believed, that an infertile breed of animals produced between two distinct species of animals, as the mule, procreated between the horse and the aſs, or the jumarre, between the cattle tribe and the horse, poſseſs qualities that render them much more valuable than either of the parents by themselves; certain qualities indeed that seem to be *sui generis*, and not merely a compound of those of the two parent animals. I pretend not to say that this is certain, but if it be, it may afford reason to believe that *mongrels*, produced between two varieties of the same species, may in some respects poſseſs not only the compounded qualities resulting from a mixture of the two, but some other peculiarities superadded, that may render them still more serviceable to man.

In confirmation of this opinion, I have, since the above was written, met with the following remark, in a book entitled a general view of the agriculture of the county of Middlesex, drawn up by Thomas Baird, for the consideration of the board of agriculture and internal improvement." Speaking of the improvements by the celebrated Mr John Hunter at Earlscourt, in the pariſh of Kinsington, he says p. 42.

" This gentleman has at present a very beautiful little cow from a bufaloe and an Alderney cow. This animal is in some measure kept for her beauty: and what adds to it, *ſhe is always plump and fat, whether in summer or winter, and upon much leſs food than would be sufficiect to support a beaſt of the same size of the ordinary breed.* I do not find that ſhe exceeds in quantity of milk, but the quality is very good, *and it is certain ſhe can be fattened at much leſs expence than an ordinary cow of the same size.*"

If this ſhould be a general rule, and not a particular exception to it, it would be a very beneficial improvement indeed. Farther experiments must ascertain this point.

And if both theſe improvements were effected, the ultimate degree of perfection in any one reſpect can only be attained by a continued careful and uninterrupted attention to the individuals of the breeding ſtock, that with a diſtinguiſhing eye every valuable peculiarity which accidentally ariſes, may be inſtantly ſeized and perpetuated, and every hurtful ſingularity, be carefully baniſhed from the breeding flock. Among the females this is of great uſe; but among the males, the importance of it is proportionally greater: for a female can only rear one, or at moſt two young in a ſeaſon, ſo that the flock is either benefited or hurt to that amount by her progeny; but above an hundred may in ſome caſes ſpring from a ſingle male, and of courſe the flock will either be deteriorated or improved in the ſame ratio, by a judicious choice of the male or the reverſe.*

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* No attempt that I know of has ever been made *in practice* to obtain the improvements that might be gained under the two firſt heads, unleſs the trials now making by the ſociety for improving Britiſh wool, and thoſe made by ſome enterpriſing individuals, as Warren Haſtings Eſq, Sir Joſeph Banks, Mr John Hunter, Thomas Johnes Eſq, M. P. and a few others, who have of late imported from diſtant regions ſome valuable domeſtic animals not hitherto known in this country, not for the purpoſe of being led about as a ſhow, to amuſe an idle curioſity, but for the purpoſe of propagating their breed, and thus giving room for comparative experiments between theſe and other animals of the ſame kind, may be ſo called; and the alterations that have been made by importing horſes into England,

and breeding from them, which give ample encouragement to follow a similar plan for improving other breeds of domeſtic animals.

With regard to the last mode of improvement, that by selection only of the best individuals of the same kind, and breeding from these, the practice of Mr Bakewell, all of whose experiments are reducible to this claſs, abundantly ſhows the amazing lengths to which improvements may be carried by this kind of attention continued for a long time. This man, whose name will long be mentioned with respect among agricultural improvers, raised his flock by this means alone in the course of a few years to such a degree of superiority above others, that spirited farmers in his neighbourhood seeing the benefits that would accrue to them from poſseſsing a superior breed thus improved, as early as poſsible, hired the use of some of his rams for one season only, at great prices. I have been credibly informed that for one particular ram has been drawn at the rate of ONE THOUSAND POUNDS STERLING, in one season. Foreigners will, from hence, with astoniſhment perceive the energy which the hope of gain inspires in a free nation, where personal property is entirely secured by the mild protection of the law impartially administered. This ought to be considered as a lecture in political economy of infinite importance. " He that hath ears to hear let him hear," that his understanding may be enlightened !

# APPENDIX SECOND

## THOUGHTS ON THE EFFECT OF CLIMATE IN ALTERING THE QUALITY OF WOOL, SUGGESTED BY READING DR PALLAS'S ACCOUNT OF RUSSIAN SHEEP.

DR PALLAS, whose attention to the economical history of the ſheep deserves the highest commendation, while the justneſs of his observations in general, considering the imperfect information he could receive from the people with whom he conversed on this subject, discovers an astoniſhing degree of philosophic acumen, has been induced, from facts that occurred to himself in his own peregrinations, to believe that a variation of climate has a powerful effect in altering the quality of the wool of ſheep; and that extremes of heat and cold alike tend to render the fleece coarse and hairy. The subject is too important in its consequences to be paſsed over slightly; and the following hints are thrown out with a view to lead to a more particular investigation of it, before any final conclusions are adopted.

We can conceive that climate may produce an alteration of the quality of wool in three ways, which ought to be discriminated before we can form precise notions on this subject.

*First*, It may operate directly on the filament itself while growing, so as to render the particular parts of that filament coarser or finer in proportion to the degree of heat that prevailed at the time every separate part of the filament was produced; or,

*Second*, The heat or cold may be conceived capable of producing such a total change in the animal economy, as to dispose those ſheep which have ever been subjected for a sufficient length of time to its influence, to produce a greater or smaller quantity of wool, and also to alter its quality in respect to fineneſs, *&c.* not only at the present time, but even during the whole future period of its life ; or,

*Third*, This over-ruling influence of climate may be supposed to be so powerful as not only to produce a permanent change on the temperament of the animal itself, which ſhall affect the quality of its fleece as long as the animal which has once been subjected to that heat, ſhall live ; but also to affect the *progeny*, so as to dispose them ever afterwards to produce wool of the factitious kind, if you please to admit that phrase, which was created by the influence of climate on the parent animal. On each of these heads I ſhall beg leave to offer a few remarks after having made a few preliminary obſervations.

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*Parallel between wool, hair, &c. and vegetables.*

Wool and hair reſemble vegetable productions in ſome reſpects very nearly, though in other reſpects they differ from them conſiderably. Like vegetables from the earth, theſe animal ſubſtances ſpring out from the ſkin, to which they firmly adhere, and from which they ſeemingly draw the nouriſhment that ſuſtains them; like vegetables too they advance in length by gradual increment, which though not perceptible at the time, can be eaſily meaſured by comparing their length at different periods. The variety of kinds of vegetable productions is very great, and they differ in their habitutes and peculiarities amazingly, ſome being perennial, ſome annual, ſome of large ſtature, others ſmall, &c; and though among the annual productions referable to this claſs, the diverſity is comparatively ſmaller, yet it is ſtill very conſiderable. Some kinds are annual, as wool and the body hairs of moſt animals, others are perennial, as the tails and manes of horſes, the hair of the human head, &c. Some kinds continue to advance during the whole period of the animal's life, with nearly an equal degree of increment in equal times, as the human beard; while others soon attain their full stature, and remain ever afterwards entirely stationary, as the hair of the human eyebrow, but still more particularly so, the eye laſhes. In these, and other respects, the similarity between these animal and vegetable productions is very obvious.

Their diſsimilarities, though not so obvious at first sight, are also very considerable. Among vegetables it is a general rule that the augmentation in size is by an additional increment, not only in length, but in their other dimensions also: among these animal productions, it is a rule equally general, that the whole of the increase in size consists in their gradual elongation only. Human head hair grows every day longer and longer; but its thickneſs continues nearly the same. Among vegetables too their gradual elongation very generally takes place nearly at the points of the ſhoots, while the parts below remain stationary in that respect: but the case is quite reversed with regard to wool and hair for in them the growth takes place entirely at the bottom of the stem, while the points never, that I have been able to observe, make the smallest advances.

This progreſs of the growth of wool is beautifully illustrated by an experiment that has been made many millions of times in Scotland, though without any intention of illustrating this fact, viz. the *laying* of ſheep with tar, commonly called *smearing*. About the month of November, annually, most of the farmers in the south of Scotland, cover the whole surface of the body of their ſheep, with a composition of tar and butter in certain proportions. This is done by separating the wool on the surface in long ſhades, and preſsing the composition upon the ſkin and along the roots of the wool by means of the finger. The tar thus laid on adheres to the wool at that place, and makes a black mark, which remains quite perceptible as long as the wool remains upon the ſheep: but this mark gradually rises from the ſkin as the wool grows, so that at ſhearing time it is found to be nearly in the middle; the under part of the wool, which had grown during the winter and spring being of a pure white, below this black ring. The progreſs of the growth of the hairs of the human beard is equally observable in the operation of ſhaving, where it is evident that the stumps only advance by a gradual protrusion, as it would seem, of the hairs through the ſkin, very unlike to that which takes place when the stem of a vegetable is cut over, which remains for ev stationary, and new ſhoots only puſh out from around it.

But the most remarkable diſsimilarity that takes place between vegetables and these animal productions, is in regard to their propagation. Vegetables are reared from seeds; and may be transplanted from one soil to another, whereas these animal productions are appropriated by nature, each not only to the particular animal to which they belong, but also to the particular part of the animal from which they spring: and if in some cases it be in the power of man to eradicate these, this is always a work of great violence and difficulty; but it is very doubtful if in any case he can be able to rear them where they would not naturally grow; and in no case can he transplant those of one claſs into the place of another.

Another pretty obvious diſsimilarity between vegetables and these animal productions is, that though cold tends in general to retard the growth of vegetables, and to stint their size in all their dimensions, it seems in these respects to have no perceptible influence on animal hairs. The human beard advances nearly with the same rapidity in winter and in summer; and is equally soft or rigid in cold or in warm climates: and from the experiment above related, it appears that wool advances equally faſt during the winter as the ſummer months. Indeed it has been by many ſuppoſed that cold weather rather promoted than retarded the growth of wool, and animal hairs: but this opinion we ſhall have occaſion afterwards to examine.

Among the annual *animal* productions themſelves, there are many ſtriking diſſimilarities; many of which, the limits I preſcribe to myſelf in this eſſay, prevent me from pointing out; but it is neceſſary I ſhould remark ſome of them. The moſt uſeful to man of all theſe animal filamentous productions is the wool of ſheep; and as our object here is chiefly to aſcertain the moſt ſtriking peculiarities of wool, ſome circumſtances that tend to diſcriminate it from other animal filaments that nearly reſemble it, may not be unacceptable to the reader.

The wool of ſheep, like the body hair of horſes, cattle, and moſt other animals, begins and completes its growth in one year; and like them alſo, after having completed its growth it looſens of itſelf from the ſkin and falls off, being ſucceeded by another freſh crop which comes in its ſtead. But it differs from them in reſpect of the uniformity of its growth, and the regularity of its ſhedding. Every filament of wool ſeems to keep exact pace with another in the ſame part of the body of the animal; the whole crop springs up at once; the whole advances uniformly together; the whole loosens from the ſkin nearly at the same period, and thus falls off if not previously ſhorn, leaving the animal covered with a ſhort coat of young wool, which in its turn undergoes the same regular mutations. Among other animals the case is different. Their hairs discover not the same uniformity of growth; they loosen from the ſkin unequally, and drop off one by one, so as to leave the old and new hairs at one season blended together for a long time, and never discover that sudden and total nakedneſs so observable in the ſheep at the beginning of summer. This seems to constitute one distinguiſhing characteristic of wool *.

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* Whether these filaments die out entirely from the root when they loosen from the ſkin, like annual plants when they have perfected their growth, or whether, like herbaceous plants, the ſhoots only are annual, while the roots remain, and send out freſh ſhoots to succeed them; or whether, like young animal teeth, the young ſhoots spring up in the same socket with the old, and force them out upon their points: or in what other manner this change is effected must be left to future physiologists to discover. From the peculiarities of wool to be afterwards mentioned, there is some reason to suspect that the new filament always succeeds another in the same place. It would seem probable also that other body hairs of animals, spring out by the side of the old before they loosen. But this is mere conjecture.

In another respect is the wool of ſheep eſsentially different from the hairs I have had occasion to examine. Hairs for the most part are either uniform in their thickneſs throughout their whole length ; or if there is any difference, they are smaller at their point than at their roots *. Wool, on the contrary is always variable in the thickneſs of the filament throughout its whole length. And in general it is considerably thicker towards the points than the roots, though this I ſhall have occasion to ſhow is not universally the case. This constitutes another, and a still more characteristical distinction between wool and hair than the former.

I have had occasion to remark above that the hairs of the human beard seem to be protruded through the skin, nearly in the same manner, as if the point of a wire were puſhed through a hole in a plate, being thus formed of a uniform thickneſs throughout. The filament of a silk worm is moulded nearly in the same manner. The viscid juice which constitutes the silk, is generated in the body of the creature, and being puſhed through fine holes in the animal, formed for that purpose, is first fixed to an

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* In some kinds of hairs this is very observable : as the whiskers of cats.

external object, and being afterwards drawn through these holes while yet in a soft and yielding state, is no sooner excluded, than it hardens so as to retain its ſhape and size, and thus constitutes a kind of animal flexible wire, which we call a thread, which seems to be of an uniform thickneſs throughout its whole length. Could we suppose that by the influence of any cause whatever, the hole which forms the mould of the silk could be occasionally dilated, the part of the filament that was drawn through the hole at that period would of course be thicker than the others; and it would vary through its whole length in proportion as the influence of that dilating or contracting power was exerted or withheld.

It is not alleged that a filament of wool is thus moulded; but the above is given merely as an illustration of the manner in which an effect might be produced upon a filament, nearly similar to that which is universally observed to take place in regard to wool.

These general observations being premised, we ſhall now proceed to inquire what is the influence of heat or cold on wool under the threefold distinctions already specified.

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### 1. *Of the influence of heat or cold on the filament itself.*

It has been long known by persons who work in wool, that the points of the filament, which form the outer part of the fleece of ſheep, are in general much coarser than the roots of it, but the cause of this phenomenon never seems to have attracted their notice. The following experiments were made with a view to discover this, and seem to be perfectly satisfactory. They are recorded in Anderson's observations on the means of exciting a spirit of national industry publiſhed some years ago, p. 104, from which they are here transcribed.

" It is some years since I first took notice of the above mentioned fact ; (viz. the coarseneſs of the points of wool,) and having often had occasion to converse with people who had never observed it, I was on many occasions induced to ſhow them some wool before they could be satisfied of it ; so that I had many opportunities of seeing the experiment verified, without having met with one instance in which it failed, or was in the least doubtful.

" In the month of June of this present year 1775, I took some filaments of wool from a fleece lately ſhorn from the ſheep, with an intention to ſhow a friend the difference between the fineneſs of the root-end and that of the top; but although there was a perceptible difference between them, yet I was a good deal surprised to find that this difference was far leſs than I had ever observed it before. At first I imagined that my former observations might perhaps have been erroneous; and that what I had imagined to be a general rule was perhaps only a particular exception, arising from some accidental unobserved cause; and therefore, with some degree of eagerneſs, examined several other fleeces; all of which I found to agree in this particular with the first.

"At a loſs to account for this singular phenomenon, I continued to reflect upon it for some time; and as I again and again examined with great attention the separate filaments of wool, I could not help remarking that the root-end of the filament was not the finest part of it, as I had till then imagined; but could plainly perceive, that it was sensibly smaller about a fourth or fifth part of its whole length from the root-end than it was there; so that the whole filament was of unequal thickneſs in every part, varying in this manner: At the point it was thicker than at any other place; from whence it gradually and slowly diminiſhed for about three fourths of its whole length, from which it began, at first imperceptibly, but gradually more sensibly, to increase in size as it approached towards the root-end.

" This form of the filament soon satisfied me as to the cause of the phenomenon that had at first perplexed me, and at the same time afforded a very clear illustration of the great effect that the climate has upon the fineneſs of the wool. For it was here palpably evident that that part of the filament that was produced during the summer months, forming the points of the wool, was coarser than that which grew during the cold winter months, so that it gradually grew finer and finer as the rigour of the cold increased, till about the month of February, when the cold is usually most intense in our climate ; after which time, the weather beginning to grow gradually warmer and warmer, the size of the filament as gradually expanded, till the middle or end of May, when it was separated from the body of the ſheep.

" I was, by this experiment, furniſhed with a very satisfactory answer to an objection that had often before been made against the opinion I had entertained, that the cold of the season in which it grew was the cause of the superior fineneſs of the roots in comparison of the tops of the wool ; it having been often alleged, that it was poſsible this circumstance might rather be occasioned by the warmth that was produced near the ſkin of the ſheep even during the cold weather, by the length and cloſeneſs of the wool so perfectly covering its body at that season. But had this been the case, the fineneſs must have gradually become greater at the roots as the deepneſs of the fleece increased, and of consequence the very root of the filament ought to have been the finest part of it.

"This phenomenon appeared to tally so exactly with the idea I had preconceived, as to make me be afraid lest I might become the dupe of my own prejudices, which might make me imagine that I actually perceived things, that only existed in my own imagigination; as has often happened with others in the same circumstances. But to guard against all danger of being imposed upon in this respect, I drew out some of the filaments singly; and having doubled them in my hand, held out the two ends to a person who knew nothing of my intention in doing it; and having aſked which was smallest, the root-end was invariably made choice of as the smallest.

"I then cut the filament at the smallest part of it, as above described, and in the same manner presented an end of this smallest part along with that end of the filament that had formerly been the root; which last was as invariably pitched upon as the coarsest of the wool.

"These experiments I repeated frequently with five or six different persons, at different times; none of whom ever committed one mistake in chusing as above specified: from which I was perfectly satisfied, that my own observations had been entirely just; and that the inference I drew from thence could not be controverted.

"It readily then occurred to me, that the smaller difference between the roots and the points of the wool ſhorn at Whitsundy, 1775 than what I had ever before observed, was to be entirely ascribed to the peculiarity of the seasons for the year preceding that. For in this part of Scotland the summer 1774 was the coldest throughout that was ever known in the memory of man; which ought naturally to have made the points of the wool that grew in that season much smaller than usual. And as the spring 1775 was uncommonly warm, it was not at all surprising, that the difference between the two ends of the filament ſhould be far leſs perceptible than usual.

"To satisfy myself, however, experimentally of the difference, in these respects, between the wool of this and the former year, I was at pains to procure some wool of last year's growth; and having compared some of the filaments of it with others of this year 1774-5, the following particulars were observable.

" 1. The difference between the point and the root of the filament of wool of crop 1773-4 was much greater than between the two ends of the filament that grew in the year 1774-5; And,

" 2. The difference between the root-end and the smallest part of the filament, was much greater in the wool of crop 1774-5 than in that of the former season. This was perceived and acknowledged by others than myself, as before, to prevent my being deceived.

" These phenomena admit of as easy an explanation as the former; being the natural consequences of the two different seasons in which the separate filaments were produced.

" For the summer 1773 was very warm and comfortable, and the winter of the same year uncommonly mild; the spring of the year 1774 having been the coldest and most uncomfortable that was almost ever known.

" Hence the points of the wool were coarse, and the roots fine, to as great a degree as may ever be expected to happen in this climate: and as there was little variation between the temperature of winter 1773-4, and spring 1774, there was likewise little variation between the roots and the finest parts of the filament.

"But as the heat of spring 1775 was greater than we almost ever experienced, the roots of the wool of that year's growth were uncommonly coarse, so as to differ much more than usually happens from the smaller parts of the filament produced in winter; which was probably the cause of my remarking it so readily that year, although it had always escaped me before.

"I have been thus particular in describing the phenomena observable in comparing the wool of these two different seasons, not only to prevent any mistakes that you might fall into by making your observations on any wool that might fall into your hands without paying attention to the nature of the season in which it may have been produced; which might make you imagine, the facts had not been by me fairly related, if the appearances ſhould differ in some respects from those I have enumerated, owing to a variation of the season; but also to enable you to repeat these experiments yourself, if you ſhould be so inclined, with pleasure and advantage, instead of perplexity and doubt that might otherwise have distreſsed you.

"To verify these experiments in a still stronger manner, and give the observations a more incontestable degree of certainty, it readily occurred, that if the coarseneſs of the points of wool is to be ascribed entirely to the heat of the season in which it is produced, there must be a difference between the form of a filament of wool that has grown upon a lamb, and one that has been produced upon a ſhorn ſheep. For as the lamb is yeaned in the spring, while the weather is yet cold, if our observations have been just, the point of it ought to be finer than that part of the wool that grows during the warmer weather in summer.

" To ascertain this particular, I examined some filaments of wool that had been cut from a lamb on the 15th of August this season 1775, and had the satisfaction to find, that this additional trial tended to confirm all the foregoing observations : for the roots of this wool were sensibly coarser than the points ; which is directly the reverse of what invariably happens with regard to the wool of old ſheep.——This experiment I also tried as before, by ſhowing the two ends to different persons, none of whom ever committed a mistake.

" From this experiment it also follows, that a filament of the wool of a ſheep of the first ſhear, commonly called in England as well as Scotland a *hog ſheep*, if it has not been ſhorn, will always be of a different form from that of a ſhorn ſheep ; as it will gradually increase in size from the point till about a fourth part of its length from thence, after which it will as gradually diminiſh till within about a fourth of the root-end; when it will begin again to expand till it arrives at the root altogether. On this account it is neceſsary, if you repeat the experiments, to take care that you do not get a *hog's* fleece instead of a ſhorn ſheep.

"These experiments demonstrate in the clearest and most satisfactory manner, that heat at all times tends to render wool coarser in quality, and that cold to a certain degree is indispensably neceſsary for the production of fine wool; so that the opinion usually entertained on this head is directly the reverse of truth.

"In consequence of the discovery that the wool which grew in cold weather was finer than that which was produced in the warm season, it occurred, that if a ſheep ſhould carry such wool as to admit of being cut twice in one year, their would be a poſsibility of separating the coarse part of the filament from the fine, which might sometimes be attended with very beneficial consequences.

"To try if this could be done with profit, I took two lambs that carried long wool, and on the 12th August 1775 caused them to be clipped; and having taken a lock of wool exactly from the top of the ſhoulder of each, marked the lock of wool by a piece of paper, referring to a particular mark put upon each of the lambs, so as that they might be exactly known, and with certainty diſtinguiſhed from one another in the spring.

"In the end of May 1776 these two ſheep were again taken, and a lock of wool cut exactly from the same part of the ſhoulder from whence the former had been cut.——These were compared with the two former locks; when it was found, that the wool which had grown before August 1775, was twice as coarse at least, and much harder and drier, and more apt to fly about in separate filaments when working, than what had grown between August 1775 and May 1776. It was likewise remarkable, that there was little variation in the size of any part of each of these filaments, that which grew in summer being nearly of an equal coarseneſs in every part, and that which grew in winter being as equally fine.——The winter was not remarkably severe, nor the spring uncommonly hot."——

From these experiments it seems to be undeniably proved, that wool produced in a hot climate must be infallibly coarser than the wool produced from the same animal if it had inhabited a cold climate would have been; but in as far as these experiments go, it would seem that the influence of the heat ceased to be felt upon the filament the moment that heat abated; so that like the mercury in a thermometer, it may be made to vary *in infinitum*. Its effects therefore are only local and temporary; nor can we discover the smalleſt pointing at a permanency of effect from any of theſe experiments.

### 2. *Of heat as producing a permanent variation of fleece of the individual ſheep.*

Conſidering the animal ſkin in reference to the production of animal filaments, as nearly analogous to ſoil in reſpect to vegetable productions, we can eaſily form an idea of the poſsibility of rendering the one more fertile and productive, as we know with certainty can be done with regard to the other by care and good management; we know that this animal ſoil, if the phraſe will be admitted, *naturally* loſes its productive quality in certain caſes, and either ceaſes to yield any crop at all, or affords only a very ſcanty crop. This is obviouſly the caſe with the human head as age advances; and baldneſs is the neceſsary conſequence. To remove this ſterility, and reſtore the ſame productive quality to it as at an earlier period, would be a deſirable thing. The profits that would accrue from the poſseſsion of ſuch a ſecret are ſo obvious, and at the ſame time it ſeems from analogy to be a thing ſo attainable, that many have been tempted to pretend that they had discovered the secret of rendering thin hairs thicker, by means of certain unguents and pomatums that they sell at a high price, as infallible cures for this disease ; yet baldneſs still prevails among aged persons in the rich, as well as the poorer claſses, which gives room to suspect that these preparations are either altogether inefficaceous, or nearly so.

We can conceive also that climate may have such an effect upon this kind of animal soil, as to dispose it to produce a greater or a smaller crop, or to make the same ſkin be disposed to produce filaments of altogether a different nature in one case from those it would yield in another. In consequence of this idea an opinion very generally prevails, that if wool bearing animals, are carried from a cold, to a warm climate, the constitution of the creature is so much altered, as to dispose the body to produce there fewer filaments than it did before, and these also of a much coarser texture : In ſhort to yield a fleece not only much thinner in the pile, but also much more of the nature of hair than wool. This opinion has been so often aſserted with confidence by various persons, that I myself for a great many years believed there was no room to doubt the fact. I have since, however, found reason to suspect there is room here for hesitation and doubt; so that farther than the *temporary* effect of heat upon the filament above explained, I am now inclined to suspend my judgement till facts are farther elucidated.

The first circumstance that induced me to reflect seriously upon the subject, was a hint from Dr Wright of this place, a gentleman well known for his useful botanical researches, who lived many years in Jamaica, and who is a much more attentive observer of things of this nature, than the generality of the inhabitants of those islands. He aſsured me that this was a mere vulgar opinion that had no foundation in experience for its support. He ſays that in the West India islands, it is true, there is to be found a breed of ſheep, the origin of which he has not been able to trace, that carry very thin fleeces of a coarse ſhaggy kind of wool; which circumstance he thinks, may naturally have given rise to the report. But he never observed a ſheep that had been brought from England that ever carried wool of the same sort with these native ſheep: on the contrary, though he has known them live there several years, these Engliſh ſheep carried the same kind of close burly fleece that is common in England; and, in as far as he could observe it was equally free from hairs.

But what still more effectually confirmed him in the opinion that it was not the heat of the climate which occaſioned the thin hairy fleeces of theſe native ſheep, was, that he obſerved the ſame thinneſs of fleece and coarſeneſs of pile among theſe native ſheep, in the flocks that live among the hills there, in many parts of which, the climate is even perhaps colder than the ſummer heat in England, as it was among thoſe individuals who inhabit the burning plains nearer the ſhore; he therefore attributes this peculiarity to the influence of breed rather than of climate.

In extending our view from Jamaica, we find this opinion of Dr Wright, ſupported by innumerable facts, that occur occaſionally in the courſe of reading. Of this nature is the fact quoted by Dr Pallas on the authority of Demanent, Bee, vol. xvi. p. 131 that there are two kinds of ſheep in guinea, one of which carries wool, and the other a thin coat of hair only, reſembling goat's hair. We alſo know that the fineſt wool produced by any ſheep hitherto known is that of Perſia and Caſhimere. And though there be mountains in Perſia, that are of a cold temperature, yet there is no evidence, that theſe fine woolled ſheep, never deſcend into the plains; or that they do not indeed at all times inhabit thoſe parts of the country where paſture can be found for them, even though very hot. In India, it is known there are two breeds of ſheep, one of them of the fat rumped ſort,—large animals and which are generally supposed to carry thin fleeces and hairy wool; but there is also another breed of very small ſheep more generally diffused over the whole of that country, which carries a close pile of wool; though I have not been able to learn, whether it be fine or not; the quality of the wool being very little adverted to in that country. I myself, have seen some ſheep from the Cape of Good Hope, with broad fat tails, which carried a close fleece of wool, of a *fine* pile, but so much intermixed with stitchel hair—the same as is to be found among some of the Shetland ſheep and particular breeds in England, as to render it if no use in manufactures. We now also know, in this country, that Spaniſh ſheep carry the very closest fleece of any breed that ever has been seen here. There are ſheep, natives of this country, which will be allowed to be a colder climate than Spain, whose fleeces are so thin that I will venture to say ten times the number of filaments could be found in the same extent of surface of Spaniſh ſheep as on them.

From these considerations I am inclined to doubt the fact, and rather believe the notion has originated in inaccurate observation, and theories of a delusive nature.

From the influence of such theories, mankind have been in general also inclined to believe that the fleece of ſheep, as well as the fur of other animals, is not only invariably thinner in warm climates than in colder regions, but that it is thinner in summer than in winter; even in this country; without being at the trouble of satisfying themselves experimentally on this head, which might easily be done. Nature, say they, is so beneficent to all her creatures, that ſhe renders the fur closer in winter than in summer, in order to enable the animal to resist the rigorous cold of that climate; and because the idea is beautiful, the fact is admitted without proof. Nature, it is indeed true, has provided, with that beneficence so truly conspicuous in all her works, a much warmer covering for fur-bearing animals in winter than in summer; but not by the means of *thickening* the fleece at that period, but of lengthening it only, which answers precisely the same purpose *. The ſheep, if left to itself, drops its old fleece in the beginning of June, when the warm weather approaches; and, like a man who throws off his thick winter coat and aſsumes a light summer jacket, the animal appears at that season almost naked. Other fur-bearing animals experience a similar change at that season of the year, and thus are universally clothed with a lighter coat in summer than in winter, without having any change produced on the *thickneſs* of the fleece at that season.

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* We are too apt to judge of other animals by ourselves, without adverting to the infinite power of nature to produce the same effects by means extremely diversified. Some animals are endowed with a power of resisting cold to an astoniſhing degree without any covering. The naked toes and legs of birds are a strong illustration of this. Were a man to grasp with his naked fingers a frozen branch for some hours, as they do, the fingers would be entirely lost, though of a size an hundred times larger than the bird's toes.

From the experiments before narrated, it appears that the case must indeed be the reverse of what has been alleged ; and that, in consequence of the greater thickneſs of every filament of wool in summer than the same filament bears in winter, the fleece must be actually closer in the first than in the last season, unleſs it ſhall appear that there are a greater *number* of fibres at the bottom of the fleece than at its top. That this is not the case, unleſs where accidental causes have produced it, is well known to every person who is in use to handle wool ; and indeed any person can satisfy himself of this fact with the st greatəease, by examining a lock of wool taken from any unbroken fleece that falls in his way ; for he will at once perceive that the filaments are in general all of nearly an equal length, and that there are few or no loose fibres starting out towards the root when stretched between the hands, which must unavoidably happen, had the hypothesis been well founded. From all these considerations it seems reasonable to believe, that warmth of climate operates not upon the constitution of the ſheep in such a way as to diſpoſe the ſkin to produce either more or fewer filaments of wool from the same extent of surface than it would have yielded in a colder region, nor to alter the nature of that filament farther than the *temporary* effect upon the wool already taken notice of, which ceaſes to operate upon the wool the moment the degree of heat abates; so that by tranſporting the same ſheep which had had a part of its wool rendered coarſe by the heat of a warm climate into a cool region, the parts of the very same filament that ſhall be afterwards produced, will be equally fine as it would have been had the animal never experienced the heat at all. The general opinion that prevails on this head therefore I conceive to be an error that ought to be corrected.

### 3. *Of heat, as affecting the progeny of such ſheep as have been ſubjected to its powerful influence.*

If we have had reaſon to doubt if any permanent change is produced on the animal itſelf by a change of climate, we will have much leſs reaſon for believing it can have any permanent effect on its deſcendants, so as to lay the foundation of a new breed. I ſhall not therefore waſte words on this ſubject.

But it is not difficult to perceive how the progeny of ſheep brought from Europe to the West Indies ſhould gradually degenerate, till they at last come not to be distinguiſhable from the West India breed, and how of course it ſhould be believed that this change had been produced by the climate ; for these stranger ſheep, blending with the native breed by procreation, must have the quality of their descendants debased ; and by succeſsive intermixtures the descendants would gradually approach to the nature of the native ſheep, so as not to be distinguiſhable from them after a few generations. Thus, though the fact be certain, that the descendants of European ſheep in the West Indies do become, in time, *apparently* the same with the native flock, the inference, that this effect is produced entirely by the influence of the climate is erroneous.

Another opinion, probably ingrafted upon the former, is also very common, viz. that cold climates only produce fine furs of any sort; and that therefore cold is universally requisite for the production of fine animal filaments. The ermine and the sable, are found in Siberia ; and Siberia they think is a cold country. But a great part of Siberia is very hot in summer ; and many of these creatures are there found. The fact is, they are found in every desert region that abounds with wood, which by furniſhing nuts and seeds on which mice are fed in abundance, the rapacious vermin of the weasel genus are there collected together in search of their prey. A cold region is in fact so little susceptible of converting all kinds of fur into fine filaments, that these regions produce many animals that afford hairs only of the very coarsest sort. The wild boar is a native of cold regions; whose hair is bristles; and few kinds of hair are equal in hardneſs to that of the white bear, which inhabits the icy sea. There seems indeed to be no connection whatever between the fineneſs of the fur of the native animals of any country, and the temperature of its climate. The cattle of Louisiana, which is a region far warmer than almost any parts of Europe, produce a kind of hair soft like silk; whereas the hair of our cattle is stiff and rigid: The beaver, which carries the closest fur, and among the finest yet known, is a native of the same regions;—and the camel, which can only live in tropical regions, and among burning sands, produces hair that is soft and elastic as wool. The porcupine, on the other hand, which produces quils instead of hair, is a native of the same regions with the beaver; and the hedge-hog, covered with pointed spines, inhabits the same countries with the sable and the ermine.

Every kind of animal produces the filamentous covering peculiar to itſelf, ſome of them fine and others coarſe; but always of the ſame nature wherever that animal can be made to live. And as we find animals that produce both fine and coarſe furs in almoſt every region of the globe, there ſeems to be no reaſon to believe that climate alone affects the fur of any animals farther than what has been above remarked of the wool of ſheep alone.

Natural cauſes may however, in certain circumſtances, determine animals of a certain claſs to inhabit certain regions in preferance to others, and theſe accidentally concurring with preconceived ideas reſpecting climate, may tend to cheriſh theſe notions; for wherever the ſavourite food of one claſs of animals is found in abundance, there it alſo will abound.

By attending to the facts brought forward by Dr Pallas, and the elucidations, which theſe have produced, it will be eaſy alſo to perceive how it may naturally be expected that fine wool ſhould be produced in temperate climates, rather than in thoſe which are ſubjected to the extremes of heat and cold, without aſcribing any part of that effect to the influence of Climate. In warm regions, wool is an object of much leſs importance to the inhabitants, than in thoſe that are colder; for there, it is leſs fitted for clothing to the natives than other productions of those climates; the natives therefore, inattentive to the fleece of their ſheep will as readily propogate those which produce thin fleeces or coarse wool, as those which afford the finest wool, and closest fleeces. But in cold climates where the fleece becomes an object of great importance to the rearer, this will not be the case. The wool-grower will therefore baniſh from his flock those that have thin fleeces, and propagate in their stead such only as have close fleeces, if in other respects they are suited to his views; and this care,continued for a course of ages, we have already seen, must produce a very great change upon the general quality of the whole race. *Close* fleeces may thus be expected to abound much more in cold than in warm regions.

But *fine* fleeces, and those affording wool without hairs, may be, for another reason, expected to be met with more frequent in temperate than in very cold regions. It happens, that in the temperate regions of Europe, the inhabitants in general are more civilized, and carry on manufactures in wool to a much greater extent than in the colder frigid regions of the north. But a man who carries his wool to the manufacturer, quickly perceives that coarse wool, or such fleeces as abound in hairs, however fine the wool itself may be in other respects, are rejected by the manufacturer, and bring a much smaller price than those which have no hairs among the wool. He will therefore in the same manner try to get rid of such ſheep as produce coarse wool, or wool that is intermixed with hairs; and thus these kinds of ſheep will gradually disappear in those regions. But in colder climates where the unmanufactured wool, unseparated from the ſkin, is made use of by the natives for clothing, fine clean wool will not be so valuable in many cases as such as is coarser or more hairy. To them it is the *quantity* and strength rather than the *fineneſs* of the wool that constitutes its value. Accordingly we find that among the Ruſsians and Finns they prefer to all others, such ſheep as produce coarse ſhaggy wool resembling the hair of goats, as being warm, and more durable than they are. The natives therefore rear these coarse-wool-bearing ſheep rather than any others.

Thus it happens that from the operation of *moral* causes alone, and not in the least from the physical effect of climate, coarse hairy wool may be expected to be found alike in the regions that are exposed to the extremes of heat, and of cold; though from the same causes, we can only expect to find ſheep that carry very thin fleeces in the warmer parts of the globe.

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The substances treated of in this eſsay, which spring from animal bodies, and which agree with vegetables in their gradual growth, in their want of animal sensation, and in their reproduction after they have been cut over, may be reducible to the following claſses.

Horns, hoofs, nails or claws ;—bristles, hair, wool, feathers, down,—quills, like those of the porcupine and hedge-hog. Of a doubtful nature, as being uncertain whether they poſseſs animal sensation or not, though they doubtleſs vegetate, are tusks of the elephant, walrus, &c. scales of some land animals, and most fiſhes ; fins and ſhells both of land animals and fiſhes. These last have somewhat the appearance of being excrementous concretions. Of a nature certainly poſseſsing animal sensation, though they in peculiar circumstances advance in size, as vegetables are, spurs, like those of the cock and some other animals, the combs of cocks, and several other fowls, wattles, spines of the sea urchin, sea egg, and many others, &c. It would be desirable to have the distinguiſhing characteristics of each of these accurately described, and their peculiar qualities ascertained.

An attempt has been made in this eſsay to discriminate wool from hair, and to distinguiſh several kinds of hairs from each other, which may serve as a slight commencement of these disquisitions.

# APPENDIX THIRD.

## ENQURIES CONCERNING THE CHANGE PRODUCED ON ANIMALS BY MEANS OF FOOD AND MANAGEMENT.

IT is the province of genius to suggest new ideas, and to ſhow what consequences may be drawn from facts already known; but it is painful attention only, and accurate observation that must ascertain facts; and it is upon the authenticity of these alone, that the exertions of genius can become useful to mankind.

The observations of Dr Pallas on the changes produced upon ſheep by food or management suggest a long train of ideas to the contemplative mind: but at the same time the facts upon which his conclusions rest, are so difficult to be throughly ascertained, as to require a number of experiments, and many additional observations before their authenticity can be admitted as undeniabls; but the consequences that would result from the eſtabliſhing these facts are such us well deserve the attention of all future observers.

That certain pastures tend to fatten animals much faster than others cannot be denied: nor will any skilful grasier dispute, that some seasons, and peculiar pastures, tend to augmeut the quantity of tallow in a higher rate to the fatneſs of the animal than others do.

That saline pastures in particular have a great tendency to promote the health, and accelerate the fattening of domestic animals is well known by the long experience that has been had in Britain of the salt marshes of Kent and other counties; but whether this effect is there to be ascribed to the salt itself which the animals there imbibe, or to the qualities of the plants that these saline pastures natnrally produce, has not been hitherto ascertained.

That salt itself in substance is agreeable to anianimals, especially those of the deer kind, and salutary to them, is well ascertained by the experience of the natives of North America, who, when they can discover a bed of saline earth, find a treasure, by reason of the nnmber of wild animals which resort hither to lick it, and thus are brought within their reach to be killed. These saline banks are called *licks* from this circumstance.

That salt is salutary to ſheep cannot be doubted from the experience of the domestic flocks of Spain, where that article has been given to them artificially for time immemorial; but we are as yet in poſseſsion of no facts which ascertain precisely what are the effects that result from the giving or the abstracting of that article. That they may live very well without it, is abundantly proved by our own experience, and that of many other nations, where salt is too dear, by reason of impolitic duties laid on it, to admit of its being thus applied; but how much better they might live with it, or what changes upon the animal economy it might produce we are not able as yet to say.

From this circumstance of the universal dearneſs of salt, and the want of pastures that produce natural saline efflorescences in Europe, the natives of Europe, who we are willing to believe are the only accurate experimenters on the globe, are by no means able either to corroborate by their own observations or to refute from their experience the idea of Dr Pallas, that the *uropygium* or fat excrescence on the buttock of certain breeds of ſheep is to be attributed chiefly to this cause. None of the experiments that are known to us here seem to give any countenance to that idea. We have never heard that the smallest tendency of that sort has been discoverable on the ſheep of Spain, which have daily administered to them considerable quantities of salt; nor on the ſheep pastured on some of the smaller holms belonging to Scotland and the Northern isles, where the pastures are abundantly saline, in consequence of the sea spray continually lighting upon them, and where the ſheep greedily feed upon salt sea weed six months in the year. There it is well known that either cattle or ſheep fatten very quickly, and yield abundance of tallow; but the oily kind of fat upon the buttocks which forms the uropygium is there entirely unknown,

In the provinces of India that belong to Britain, where pastures covered with abundant saline efflorescences are very common, the case is somewhat doubtful.

There they have two breeds of ſheep: one of them of large stature with a fat rump, evidently of the same kind with the steatopyga of Pallas: the other a diminutive race of ſheep with tails that discover not the smallest symptom of having any tentendency to fat on their posteriors. Both these breeds of ſheep, from the best information I can get, are to be found in all the provinces in India; though the small breed seems to be tbe most numerous.

These circumstances make it appear at least doubtful to me if the uropygium is to be attributed to the influence of saline pastures: indeed I am inclined to believe it depends upon the original breed. But this is a point that requires farther elucidation; and I recommend it to the attention of the philosophers. The world is much obliged to Dr Pallas for having suggested the idea that the uropygium may perhaps owe its origin to this cause; and the respect that is justly due to any hint from that able philosopher, will probably turn the attention of observers so steadily towards the point, as to ascertain in due time, whether it be so or not.

Of the effects of BITTER pastures on the grouth of ſheep we can have little experience in Britain, as few of these bitter plants abound in any of our ſheep walks. On rich fields the various kinds of *gramina* in all cases form the principal part of the produce with us. And in the wild uncultivated hills, *heath* mixed with some benty graſses is the chief produce. Among woods, which ſheep like not to frequent, the ſheeps-fescue graſs, *festuca ovina*, grows better under the ſhade of trees than almost any other gramen, on which account it offers a refreſhing bite to deer in the haunts they frequent. It may therefore with great propriety be called *festuca cervina*. As to the *artemisia*, we have only one kind that is common in Britain, the A. *vulgaris* which ſheep in all cases where it can be found, devour with great greedineſs, especially its roots, which seem to form the most delicate morsel to their palates; but as this plant only thrives in cultivated ground, it is rarely found in ſheep pastures. And as it is a weed highly pernicious to corn crops, it has been in a great measure extirpated since agriculture came to be properly attended to in this country, so that you may now travel many days without seeing one plant of it. Hence we can hope for few experiments being made in Britain on this subject.

That ſheep can be made very fat upon *gramina* alone, without saline or bitter plants, is sufficiently evinced by the mutton reared in all the rich plains of Britain, which for *fatneſs* at least, perhaps exceeds any on the globe. For the information of foreigners it may not be improper here to mention a particular instance of this kind.

" A wedder ſheep that had been bred by Mr Culley at Fenton in Northumberland, was killed at Alnwick in October 1787, when four years old. His dimensions were as follow: girt, four feet eight inches; breadth over his ſhoulders, one foot three inches; over his middle, one foot seven inches and a quarter; acroſs the breast, from the inside of one fore leg to the inside of the other, nine inches. At the dividing the quarters, through the ribs it measured *seven inches and an eighth* of solid fat cut straight through without any slope; and his mutton was of the most beautiful bright colour. It was remarked the bones of this animal were exceedingly small, so that there were very little offals; but neither the weight of these, nor of the tallow and other offals were ascertained, which we regret." Sheep of this proportion of fat are not common; but those approaching to it, are to be found in every rich grazing county in Britain.

It is impoſsible to close this disquisition without taking notice of the great loſs which this country sustains in regard to the fattening of ſheep and other domestic animals, from the being deprived of the use of salt in economics, owing to the very high duties upon that article. If all the consequences that result from the high duties on salt in economy and arts, were taken into account, it would appear that of all the taxes that were ever imposed upon any people this is perhaps the most unjudicious and hurtful.

# APPENDIX FOURTH.

## CATALOUGE OF FUR BEARING ANIMALS

*That are, or may be domesticated, which are not yet sufficiently known in Britain, though suited to the nature of its climate, and which it would be of importance to have there, in order to ascertain their value by comparative trials.*

### *Sheep.*

1. THE *Tscherkeſsian* breed. These are of a large size, and afford good wool free from hairs. The lamb-skins of this breed are accounted a beautiful fur, which sells at a high price in Ruſsia. They are of various colours: The pure white are most esteemed: and next to these the pure black. These are of the round long tailed breed.

2. The *Boucharian* ſheep, which are said to afford wool still finer than the above, and equally free from hairs. The lamb-skins of this sort are deemed still more beautiful fur than the former; and they sell at very high prices in Ruſsia and China. Besides pure white, and black, ſhining and waved, having the appearance of flowered sattin at a little distance, there are some among them of the colour there called *blue*, which is a gloſsy mahogony colour with a slight bluiſh tinge. This is the broad tailed kind of ſheep.

*N. B.* It will be a matter of considerable difficulty to get these ſheep into this country; for although I have the means at present of corresponding with some of the governors of the southern provinces of Siberia that border with the Kirguise country, who will be disposed to lend every aſsistance in their power, yet the nearest part of it being at least two thousand miles from Petersburgh, the cattle that are sent from thence thither taking about two years to travel it, paſsing through the hands of several owners by the way, any ſheep that might be sent along with them would have a great chance of being lost in their paſsage. Boucharia is at least a thousand miles farther than the Kirguise country in the same route, so that it will be a very difficult matter to get them from thence. The natives of Boucharia, however are an active trading people, who often paſs through the whole of the Kirguise country to bring both cattle and goods to the Siberian market; and might poſsibly be brought to do any thing from the prospect of gain.

3. The *argali*, especially of the white sort, from Kamschatka and the Kuril islands. This is an animal of a large size. The fleece is represented as consisting of long hair covering a fine downy wool: It never has been properly domesticated; nor are its qualities well known. In many places this animal is found of a fawn colour.

4: The *Crimea ſheep*: of these we have little knowledge as yet, farther than that the furs made from their lambs are much esteemed in Ruſsia; though leſs so than those of the first and second sorts: many of these are of a grey colour. We know not to what race of ſheep this belongs.

5. Persian ſheep; the wool of these has been long known in Europe, and has always sold at a higher price than any other kind of ſheep's wool. It is of two sorts; one white, which sells always higher than that of the finest pile of Spain. The other has a reddiſh tinge.

6. Commonly sold by the name of *Laine rouge de caramanie*, and sells at a higher price. I have not been able to learn any particulars of the animal that

carries this very fine wool; but it is surely of importance it ſhould be known.

N. B. The best channel for information on this head seems to be through Aleppo, or Buchire in the Persian gulf, where fine Persian lambs-skins are sold as a valuable kind of fur, and are a considerable article of traffic.

7. The Tarentine flocks of old were much prized for their fine wool; and it is said they are still remarkable for the same peculiarity. It were worth while to try and get some of the wool of these to ascertain their precise value.

8. Strabo celebrates the ſheep on the coast of Barbary as being very fine; and attributes the original improvement of the Spaniſh breed to the introduction of rams from thence. They are still a strong bodied beautiful ſheep, carrying an abundant fleece. Their qualities are not known in Europe. The writer of this article once was to have got a ram of this breed from Portugal which had been given in a present by the Dey of Algiers to the Portuguese ambaſsador there, but when it was brought to the ſhips side the captain refused to take it on board, as it was then the winter season. This ſhews that this kind of ſheep is much esteemed. These, with the Spaniſh, are all the breeds of ſheep that ap-

pear to promise to be of much use to the island, that have hitherto come to my knowledge.

## *Goats.*

It is now sufficiently known that the animal which produces the fine ſhaul wool of Thibet is not a ſheep, but a goat *. The wool appears to be a fine down at the bottom of the long hair with which the animal is covered. The common goat affords the same down. Several Thibet goats have been brought into this country, so that we may soon hope to see their qualities thoroughly ascertained.

10. The Angora goat. This animal affords a hair so soft and silky as to admit of being worked up into fine manufactures, so that it is the *hair*, not the *wool* of it that is prized. It is known to prosper and to preserve its peculiarities in France and in Sweden. It promises to be of great utility to the agriculture and manufactures of this country were it introduced here. But I have not heard that ever the attempt has been fairly made. It could be obtained by the way of Smyrna.

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* There seems indeed a probability, that some kind of *ſheep* in Thibit produces very fine wool, as I have been aſsured by a respectable authority that mention is made of it in the *Aien Ackberry*; but I have not at present an opportunity of consulting that book.

### *Other wool bearing animals*.

11. The *vicuna*, this is an animal of the camel tribe, of a size nearly the ſame with a deer, and produces the valuable wool sold under the name of *Vigonia wool*, the higheſt priced article of this kind known in Europe; the animal can ſcarcely be ſaid to be yet domeſticated in its native regions, but eaſily might be ſo. It is of a fawn colour, darkeſt on the back and lighter on the belly, where ſome part of its wool is nearly white. This creature has been preſerved at Aranjuez in Spain, one of the coldeſt places in that country, where it breeds; ſo that there is no doubt that it could be domeſticated in Britain. All the wool of this animal is intermixed with ſhort hairs exactly like thoſe that debaſe the wool of ſome ſheep, the picking out of which greatly enhances its price. Were the animal domeſticated here, it is probable that by care this evil might in time be removed; it would then be an article of vaſt importance for manufactures of a fine quality. I have not heard whether the fleſh of this creature be reckoned more or leſs delicate than mutton.

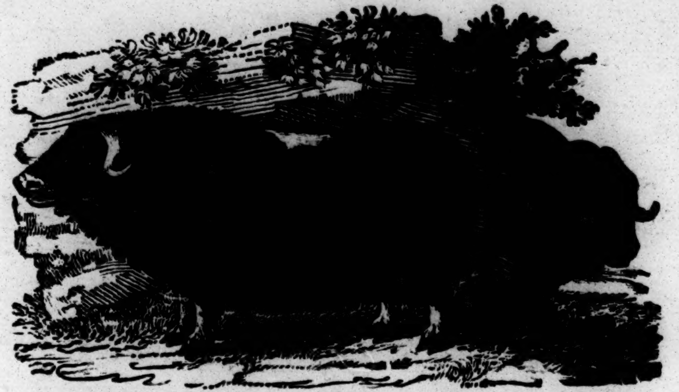
12. There comes from South America alſo another kind of wool, preciſely of the ſame colour and ſoftneſs with the vigonia wool, but much longer in the ſtaple, and ſtronger in the pile. The fineſt of

this is pure white, and entirely free from hairs. It comes over in fleeces, which have been evidently ſhorn, and of a considerable size. It is sold in London under the name of *Peruvian wool.* What the animal is that produces it I know not; but from the nature of the filament I am inclined to think it is not a ſheep. It is a valuable article of commerce for manufacture, and therefore the animal which produces it is a proper object for experiment. Probably it may be another variety of the camel tribe; four of which are said by Mr Pennant to afford wool that is employed in manufactures.

13. The *Buffaloe*, as it is commonly called of Louisiana, though it be properly a *Biſon*, has never yet been domesticated, and is very different in several respects from the animal known by the same name in many other parts of the world. Its whole body is covered over with a thick coat of hair about two inches long, which is remarkably soft, so as to admit of being easily spun. The ſkin, with the wool upon it, when properly dreſsed is one of the warmest kinds of fur yet known, though too weighty to admit of being employed as clothing. It is employed in Canada and the Northern American states for a covering to persons when travelling in calaſhes in winter; and would no doubt be a valuable article for the same purposes in Ruſsia and other northern European

countries, and would be particularly valuable for boots, in cold climates, with the wool inwards. It it surprising that no attempts should have been made by the people of Britain to domesticate this animal, as there is reason to believe it might not be leſs valuable as an article of food than the kinds of cattle here reared; and its fur would sell, at least at three times the price of a hide of an ox of the same size. The hump on the ſhoulder of this creature is reckoned a great delicacy, and would sell at a high price among our European Epicures.

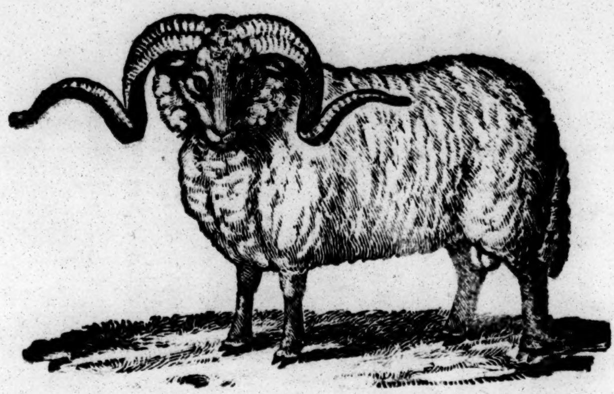
14. The *muſk bull* of Hudsons Bay is another animal belonging to the same genus, that promises to be of great value, which never has been domesticated. With respect to its fleece and appearance, this animal more nearly resembles a ſheep than an ox. It is in stature not much taller than the largest breed of ſheep; and is every where covered with a thick and deep coat of hair, the root of which is a close fur, remarkably fine, and soft, and silky. The hair is so long as nearly to trail upon the ground. The fur of this animal is evidently capable of being applied to many desireable uses in cold climates; and if any means could be contrived to separate the hair from the soft wool, it would be of great use in manufactures. Stockings have been made of it, which in soft



THE *MUSK COW* AND *BULL* OF HUDSONS BAY.

*Plate Fifth:*

BRITISH MUSEUM



A RAM OF THE *SPANISH* BREED OF SHEEP.

*Plate Sixth.*

BRITISH MUSEUM

neſs and lustre are said to rival silk. Its tail affords a strong kind of hair, which is employed for various uses by the native Esquimaux; its fleſh is reckoned very good.

N. B. It would probably be a matter of considerable difficulty to domesticate these two last named animals, as it can only be done by stealing the calves when very young; and this is an enterprize that may be attended with danger: but it certainly is *poſsible* to be accompliſhed: and if a tempting price were offered for some young ones, the natives would probably fall upon some method of effecting it. The calves, when thus obtained, might be nursed by a domestic cow; and could be driven along with their dams to some sea port town.

15. The *Sarluc* or grunting ox is another animal of the same genus, which is also covered with a thick coat of very long hair that hangs down below its knees like that of the musk ox. This animal is a native of the southern parts of Tartary, and Thibet, where it has in part been domesticated: a variety of it has been also domesticated in the higher parts of Indostan under the appellation of *Chittigong cows*. It is all over black except the mane and tail, and a ridge down the back, which are white. The hairs of the tail are very beautiful, and much prized

over all India for fly-flaps; for which purpose they are mostly fitted to silver handles. In China, the hairs of the mane are dyed of a red colour, with which the natives form an ornamental tuft on he crown of their bonnets, so that it would be an article of value in our commerce with China and India. This might be obtained from Calcutta.

In the above list I mention not the camel, which affords a wool and hair useful in several arts, because it cannot be made to thrive in our climate: nor the Spaniſh ſheep, because these have been already partly tried in this island, and are found to thrive equally well as our native breed, and afford wool in every respect as good as in their native country; so that we have only to obtain some of the best of this breed, to perpetuate the kind here. Nor do I mention the beaver, the otter, and several other fine fur bearing animals, which never yet have been thought capable of being domesticated. I have confined myself to such animals as may with certainty admit of being tamed and reared in our own climate. The list might be considerably augmented; but it is best to confine ourselves at first to a moderate number, not to startle the imagination of those who have no great spirit for enterprize.

# APPENDIX FIFTH.

*DIRECTIONS for choosing ſheep and other wool bearing animals, of any particularly valuable breed, when intended to be sent to Britain from any great distance, so as to obtain the very best individuals of each kind.*

MANY gentlemen of fortune and interprise in Britain, have discovered a laudable ambition of late to obtain from foreign parts, all the best breeds of domestic animals of every kind that can be found on the globe, which seem to be capable of being reared in this island, for the purpose of ascertaining their peculiar qualities respectively. At the head of this respectable list might be placed the king; and among the members Sir Joseph Banks, president of the royal society London, Sir John Sinclair M. P. president of the society for the improvement of Britiſh wool, Warren Hastings esq. late president of the council at Calcutta, John Hunter esq. surgeon London, lord Sheffield, the earl of Hopeton, colonel Fullerton, &c. &c. As many benefits may result to this country from these trials, if prosecuted with spirit, and conducted with propriety, it behoves every man to forward these undertakings to the utmost of his power. With this view the following hints are submitted to the public.

In every large collection of any one kind of domestic animal that can be any where obtained, there will be found, upon a strict examination, a great diversity among the individuals of which it consists, some of them poſseſsing one peculiarity, and some of them another, in a much more eminent degree than others do, so as to render one much more beneficial to the owner than another : and as it is now generally admitted, that these peculiarities are in most cases, to a certain degree at least, hereditary, it is of much importance, where a great expence must at any rate be incurred in transporting these animals from distant parts, that none but *the very best* individuals of every kind ſhould be selected for the purpose of these experiments. But as those persons who have never turned their attention to subjects of this kind may be at a loſs how to select the best sorts with certainty, and may thus inadvertantly send over those of an inferior quality, where others much more valuable might have been had, it will not be a useleſs labour, to point out a mode of proceeding in this respect, which if carefully followed, will enable any person to select with tolerable certainty, the very best individuals in every case. The following directions are calculated for this purpose. Had the writer been addreſsing himself to connoiſseurs on this subject, the proceſs might have been greatly abridged; but no person, it is hoped, will think that a little trouble and caution, and scrupulous care, bestowed for *once* only, when the consequences of that care will prove highly beneficial for ages to come, ought on any account to be deemed labour in vain, but much the reverse.

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### *General rules.*

I.

None but those kinds which poſseſs some valuable peculiarity ought to be sent.

II.

The value of the fleece is the principal object to be attended to; but as goodneſs of fleece, and value of carcase may be conjoined, both particulars ought to be adverted to.

III.

No colour can ever be so valuable as white; and the purer that white is, the better; therefore where there are animals of other colours, particulary ſheep, the white ought to be principally selected. If any other colour be very much esteemed for its beauty, a *few* of these may be sent, but in no case send those that are spotted of different colours, or mottled.

IV.

When one or more females of any colour are sent, be sure to send a male of *the same colour* and qualities along with them. In all cases let the males and the females of *any one sort* be chosen as much alike in all respects as poſsible.

V.

If it can be done, more than one male and one female of every variety ought to be sent, to guard against accidents, but one male only with one or more females of *the same sort*, ought to be sent in one ſhip, where frequent opportunities occur, that thus in case of accidents to one parcel the other may escape.

VI.

The proper time for selecting ſheep for our purpose, is when they are lambs, just before they are to be separated from their mothers. They ought always to be chosen thus young, that they may have a chance of living the longer when they reach the place of destination, and as they can then be easi, ly tamed, so as to cohabit with man almost like a dog, which is of much consequence on a far journey.

VII.

When a breed that is known to be of great value is to be selected, as those of Spain, Caramania, or Boucharia, for example, as great a number of females and of males ought to be chosen as can be conveniently transported; and in that case the following mode of selection may be adopted. Every other animal ſhould be chosen at the same period.

### *Particular directions.*

I.

Taking a general view of the whole flock, make choice of a number, suppose about sixty or an hundred, or in general, about ten times as many as you mean to select, of the seeming best of the flock. In this general review reject every one that is not in good health, and in good condition,—the fattest ought to be preferred to others. Reject all that are ill ſhaped, and in this particular observe, that their body be full and well rounded, their chest broad, their back streight, their belly full, but not prominent, their legs streight, well set on and firm, their hoofs clear and tough, not dry and cracked, the general air of the animal noble and vigorous, and the wool close and uniform.

Having separated the number wanted, according to these rules, let them be put into a pen, or a house that is well lighted,—you are then to proceed to the particular selection as under.

2.

In many breeds of ſheep, there is a kind of hair mixed with the wool; this is of a dry brittle contexture, usually of an opaque white, and very easily distinguiſhable from wool. Observe carefully if there is any of that among these ſheep, or of filaments of wool of any other colour. If any of them are *perfectly* free from hairs, take out every one you can find that has these hairs, and supply its place by another from the flock, which is free of them, so as still to keep up the number to choose from, but if you can find *none* that are *entirely* free of hairs, take those that have the fewest, or those that have hairs *only in particular parts* of the fleece. But if they cannot be got altogether free of hairs, only a small number of that breed need be sent, whatever its qualities in other respects may be.

Other animals, such as the vicuna, which carries fine wool mixed with the same kind of hairs, must be taken as they can be found, with the fewest hairs poſsible. If a single male and female could be got without any at all, it would be a treasure.

The fineneſs, the ſoftneſs, the cloſeneſs, the uniformity of quality of fleece over the whole body, are the other qualities chiefly to be adverted to, and the more of theſe properties that can be found united in the same animal the better.

3.

To choose, ſuppoſe from ſixty to an hundred ewes or rams, proceed thus:

1. If there be any hairs *at all* among the fleece, go over the whole number one by one, examining every part of the body of each individual with care, and ſelect twenty that have either none at all or the feweſt hairs. To do this with accuracy, it may perhaps be neceſsary to go over the ſelected ones two or three times. At the firſt-time, put into one pen all thoſe that you think good, and into another pen, all thoſe that you think indifferent, examining them as they go along, and ſeparating them one by one. To aſsiſt in this ſelection, when you get one that you think peculiarly excellent, let an aſsiſtant keep that one in his hand, that you may thus make uſe of it as a ſtandard with which the others may be compared as they come to hand; and if you afterward get one that you think ſtill better than it, let go the firſt and keep the laſt in its ſtead. In this way you will always be certain of finding the very beſt individual in regard to that peculiarity you are then

in quest of. Let this one be marked in a particular *indelible* manner, and put into a separate place by itself.

2. After this first selection, if you find there are more than twenty of the chosen breed, go over them again and pick out the worst of these, and turn them among the others. In this way you proceed till you have reduced them to *twenty*, which twenty you may mark by pinning or sewing a rag of one particular colour, (red suppose,) to the wool of each on the upper part of the neck.

3. Having separated these twenty from the others, proceed to arrange these once more according to their comparative excellence. For this purpose, it will be well if you provide a considerable number of aſsistants. Having found one ſheep that you think may probably be the best of these, give it to one of the aſsistants to hold, let another which approaches to it be given to another aſsistant, and so on till you have gone over the whole, and thus have selected the best. Suppose these aſsistants to be eight or ten, you may then compare them one by one with each other, and having ascertained which of these is the best for that peculiarity you are then in quest of, pin a mark of paper upon the coloured rag, No. 1. Ascertain in the same manner the next best, and mark it No. 2. And so on, number them

all according to their excellence, till you come to the last. Then turn the whole of these twenty among those from which they had been separated, to take their turn in the searches that are to follow.

*N. B.* As it must happen that among those flocks which have been remarkable for affording very good wool, there will be many with no hairs at all among their wool; in that case, all which have any hairs ſhould be absolutely rejected, so that no comparative selection in regard to this particular can take place, and in that case the comparative selection may begin with that which follows.

4. You then proceed after the very same manner to pick out *one* that has the *finest* and *softest* fleece, (these two qualities, *in the same breed*, will be in almost every case conjoined,) which ſhall be indelibly marked also, and put beside the best *one* that had been formerly separated;—and twenty more of the next finest fleeces, marking them also by another coloured rag, (say *blue*,) sewed to the neck, and afterwards numbering them as before; then turn them back among those from which they had been selected.

5. After the same manner pick out the individual which has the *closest* pile of wool, marking and putting it by along with the two former, and also the next best *twenty*, to be marked as before by another coloured rag, (suppose *green*,) and numbered.

6. Chooſe after the ſame manner, repeating the ſame proceſses ſucceſsively, thoſe that have the fleece moſt *uniformly equal over every part of the body*, (marked with *yellow*): Then,

7. Thoſe that have the wool of the *largeſt pile*, (marked *brown*) : Then,

8. Thoſe that are the *fatteſt*, and in the beſt condition, (marked *orange*) : Then,

9. Thoſe that have the *fineſt ſkin*, being particularly careful to diſtinguiſh that firm ſoftneſs, without flabbineſs, which is ſo desireable, (marked *pink*) : Then laſtly,

10. Thoſe that are the *beſt ſhaped*, firmeſt and handſomeſt of the whole, marking and putting by always the beſt *individual*, and the *twenty* next beſt, as before ſaid, (marked *ſcarlet*,) and numbered in the order of priority.

In making theſe ſelections for the beſt *individual* in every caſe, if you meet with two ſheep that are nearly alike for the peculiarity you are in ſearch of, then obſerve the relation they have to one another, with reſpect to other valuable peculiarities, and prefer that one which has the moſt of them : That is to ſay, if *fineneſs* be the object of your ſearch at the time, ſhould you find two equal in that reſpect, but one having a cloſer and more uniform fleece, or that is in better order, or that is better ſhaped than the other, still prefer that which has most qualities united; but in general, where the difference in regard to the peculiarity that you are in search of at the time, is very perceptible, you are to be guided by that circumstance, and disregard the others *at this time*.

After you have thus selected those that are the best for every *separate* quality, and marked them, you are next to proceed to choose for the last time, which now will be an easy matter. The ſheep that has the greatest number of *marks* upon it, is then to be selected, and it is a great chance but you will meet with one or more that have all the marks together. These ought to be selected, and after taking off the coloured rags, which have now answered all the purposes intended, let it be *indelibly* marked, and put aside as number ONE*. Then choose the next

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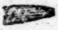
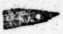
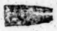
* When these are to be sent to a distance, the best mode of marking is by the ear: for that purpose, draw with a pen a ſketch like the mark, on the papers on which you write, and describing each individual, mark upon the same paper the *number* which that individual occupied in each claſs; for example say, No 1. best. The tip of the near ear cut straight over thus,  and a hole bored in the far ear thus,  This ſheep was in regard to purity, No 1. Fineneſs 3—closeneſs 4—uniformity 2—length of wool 5—fatneſs 4—ſkin 3. and ſhape 8. The second best ſhould have its ear marks described in the same manner, and the rank it occupied in all respects marked down exactly in the same manner. No. 2. for example, the tip of the near ear cut over, and one slit in it thus,  and two holes bored in the

best, marking it second, and so on till you have selected the number wanted, which at the most, where the distance is very great to come by sea, needs not exceed ten ſemales or five males; but in case the whole number cannot be found with *all* the marks, take care that thoſe which have the four first in order be chosen, taking as many of the other marks conjoined with these as can be found; for these first peculiarities are the most valuable for our purpose. Let the 6th peculiarity also be united with these, if poſsible, in preference to the 5th, where these come into competition.

I would wiſh also that all the *individuals* that had been selected as *the very beſt for each peculiarity*, ſhould be carefully preserved and sent over* along

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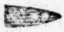
point of the far ear thus,  This ſheep was in regard to purity 3—fineneſs 4—closeneſs 2—uniformity 3—length of wool 0—that is it was not marked at all—Fatneſs 2—ſkin 4—ſhape 6—and so on of others. N. B. The reason of marking both ears is in case of any accident happening to one, the other may still serve as an index.

* By having the very best individual for each peculiarity, those at home would be enabled to take such steps as they ſhould judge most proper for improving any one of these peculiarities to the utmost poſsible degree, and of compounding the qualities together in such ways as they saw would prove most beneficial to them. It is with a view to give them this absolute command over their operations, that I have wiſhed to preserve thus carefully the best for every peculiarity.

with them, and a written account referring to the indelible marks, so as to diſtinguiſh all the particulars for which they are adopted.

The ewes being thus selected, choose the rams by themselves exactly after the same manner.

These directions will perhaps appear to be tiresomely minute to many persons, and those who ſhall have the care of making the choice will poſsibly wiſh to abridge the labour as much as poſsible. But when they advert to the very great importance of having *only the best* of each kind, and the immense expence that must be incurred in transporting them so far, it is to be hoped they will see that a little additional trouble ought not to be with-held where so much depends upon it. Had the mode of selection above mentioned been adopted, with regard to the ſheep that had been lately brought to Britain from Spain, we ſhould undoubtedly have been by this time poſseſsed of a breed yielding finer wool than any general flock in Spain,

Were a breed to be selected thus from the best flocks in Spain, or Persia, or Caramania, and when they arrived, were put under the care of such an attentive observer as a Bakewell, a Culley, or a Marſhall, with proper conveniences for keeping them separate where neceſsary, in order to make the neceſsary experiments for perfecting each kind to the utmost, and for croſsing them with other breeds: no man can form an adequate idea of the perfection, both in regard to wool and to carcase, that might in a ſhort time be produced in this island.

and poſseſsing many other good qualities that have never been there adverted to, for it is now proved by experience that the wool does not degenerate here. But were we to get hundreds of ſheep over from Spain, without selection, we ſhall not, in all probability, obtain a single individual of the finest sort. In the same manner, ſhould any one be at the expence of bringing ſheep from the Kirguise Tartary, Bocharia, Tscherkesia, Crimea, Persia or Caſhemire, were no means adopted for selecting with care the very best, we might, at an immense expence, obtain a parcel of animals that would be of no national utility; whereas, by adopting the careful mode of selection here recommended, this country may, by one single exertion of no great magnitude, be benefited very eſsentially for thousands of years to come, and by attending to the directions, even a novice in this art, if he is not of an impatient temper, cannot go wrong.

The same mode of selection ought to be adopted for the goats of angora, and all the wool-bearing animals, where it can be done. In other cases, where a choice can be made, those individuals ſhould be preferred which are the fattest of the parcel among which they have been fed, which stand the firmest upon their legs, which move witht he most freedom and ease, which are fulleſt and the most open in the cheſt, and which have the kindlieſt feeling ſkin, the mildeſt looking eye, and the fineſt general appearance. A nicer diſtinction of the *points* that a connoiſseur could judge by, could not be taught one unacquainted with it by mere words only, and therefore are omitted.

N. B. The ſelection, if poſsible, ſhould always be made while the animal is ſucking its dam: and in that caſe you are to have an eye to the condition of the mother. In all domeſtic animals, the quantity and quality of the milk yielded by them, is an article of great importance; becauſe even where they are not to be milked, thoſe which excell in that reſpect will make good mothers for fattening their young. It may thus happen that a dam which gives much and rich milk, may force forward its young in fattening, even where it has not a conſtitution naturally adapted to fatten eaſily. In this caſe, though the young be fat, the dam will be in indifferent condition; but wherever you find both the dam and the young fat, you may conclude that it is both a kindly feeding ſort, and one that gives abundance of good milk.

In all caſes, obſerve, that it is of great importance you ſhould know, if the whole number from which you are to make the ſelection have been previouſly kept on the ſame paſture, and managed in every reſpect in the same manner; therefore they ſhould always be taken from the same flock, where that can be done. Where the whole number wanted cannot be obtained from one flock, the selection ſhould be made from each flock separately; as without doing this, the comparison might be extremely inaccurate, especially in respect to the tendency to fatten easily, a very important point to farmers.

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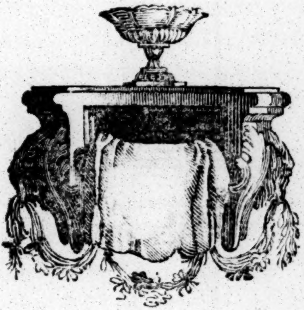
As the expence of obtaining live animals, and transporting these from a great distance, is such as to deter every individual from attempting it, who is not poſseſsed of great wealth, it may often happen, that others may have an opportunity of seeing valuable breeds of animals, who, not able to send over the live animals, might still have it in their power to send over their dried ſkins. And these if carefully selected, and rightly packed up, would serve to give people in this country a distinct notion of the value of any particular breed, and the uses to which it could be applied.

It is requested as a particular favour of all those into whose hands this ſhall fall, who have the advancement of science and prosperity of this country at heart, that they will be so obliging as to transmit such ſkins, where opportunity offers for it, accompanied with an exact drawing of the live animal [redacted] marking with precision the place where it can be found, and indicating the most probable channel through which they could be obtained, should it be afterwards judged neceſsary, and addreſs these parcels to Dr James Anderson, care of Mr A. Anderson at meſsers Webster and Wedderburn's merchants London. In return for this favour Dr Anderson on his part, ſhall do all the justice in his power to these communications, by publiſhing them properly, and mentioning the persons to whom their country is indebted for these favours, and will deposit the ſkins in such places as may tend to render the knowledge of the articles as general as poſsible.



BRITISH MUSEUM

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